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NICOLAI STENONIS
OPERA PHILOSOPHICA • VOL. I

COPENHAGEN MCMX

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NICOLAI STENONIS OPERA PHILOSOPHICA

EDITED BY
VILHELM MAAR

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VOL. I



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LIFE AND WORKS

OF

NICOLAUS STENO

I

NICOLAUS STENO¹⁾ was born in Copenhagen, the capital of Denmark, in 1638. His father was a well-to-do and intelligent tradesman of a respectable family, who in his capacity of jeweller did much work for the Danish King, *Christian IV.* When a boy *Steno* was of delicate health, and he himself relates how he would much rather listen to the discourse of grown-up people, than play with children of his own age. He received a liberal education, and in the grammar-school, which he frequented, he had, besides the headmaster *Jørgen Eilersen* (*Georgius Hilarius*) several able teachers, among whom was the young and clever, later on so well-known *Ole Borch* (*Olaus Borrichius*). The latter was deeply interested in medicine and natural science, especially chemistry, to the study of which he made valuable contributions; at the same time he was a prominent philologist, and was early appointed Professor at the University of Copenhagen. He spent some time in Holland, where he met with *Steno*, who often mentions him in his Treatises and Letters, and with whom he always remained on intimate terms.

Copenhagen
1638
—1660.

In 1656 *Steno* entered the University of his native town, where he began to study medicine in connection with the related branches of natural science. At the University of Copenhagen these studies were at this period pursued with great zeal and ability by a series of great scholars, the members of a few prominent families. Among the most renowned, some of whom, however, were dead at the time of *Steno's* entering upon his studies, may be mentioned the physical philosopher *Jacob Finke*; the astronomer *Christen Longomontanus*, the pupil and co-operator of *Tycho Brahe*; and the physicians *Casper Bar-*

¹⁾ The Danish form of this name is *Niele Steensen*, while the latinized form, generally used by its owner, was *Nicolaus Stenonis*. The form *Stenonius* also frequently occurs as well as the French *Sténon* and the Italian *Stenone*. The form usually adopted in our days is *Steno*, which is due to the erroneous conception that *Stenonis* was really the genitive case of a name *Steno*.

tholin the elder, *Ole Worm* and *Jørgen Fuiren*, to which list must still be added, perhaps as the most celebrated of them all, the physician and anatomist, *Thomas Bartholin*, the son of *Casper Bartholin*; also *Simon Paulli*, the anatomist, called in from Rostock, who eventually gave himself up to botanical studies; and finally, besides several others, the above-mentioned *Ole Borch*.

Steno's studies at the University were anything but quiet and regular. Denmark was at that time at war with Sweden, and Copenhagen was being besieged by the Swedish King, *Carl X Gustaf*. The students of the University distinguished themselves by the way in which they took part in the defence of the city, but lectures at the University were partly, and for a time altogether, suspended.

Amster-
dam 1660.

Before the official conclusion of peace, *Steno*, in accordance with the prevailing custom of the times, went abroad to continue his studies at foreign universities. He first visited Amsterdam, to where he had been supplied with letters of introduction by *Thomas Bartholin*. The latter had already long been enjoying a European reputation, and through his travels abroad and his extensive correspondence, partly published later on, he was in close contact with the world of learning of those days. In spite of his great credulity, which credulity often led him astray, and in spite of having to share the honour of his one great discovery, viz. that of the lymphatic vessels, as well with *Michael Lyser*, his prosector, as with *Olof Rudbeck* of Upsala, this remarkable man had yet founded a great school and had besides in various ways given a vigorous impetus to the scientific life of his own country. At an early period he had recognized *Steno's* intellectual gifts, and he always estimated him according to his merits. He recommended *Steno* to his friend and relative, *Gerard Blaes*, a well-known scholar of those days, Professor at the High School of Amsterdam (*Athenæum*), as well as Director of the Town Hospital (*Het Gasthuis*). *Blaes* invited *Steno* to his house, and with him *Steno* lived during the four months he spent in Amsterdam.

Though only of short duration this stay was nevertheless of the greatest importance to *Steno*, not only because of the general impressions which he received through living in a great centre of civilization, such as Amsterdam was in those days, but also because he became personally acquainted with men of great learning and culture, among whom were the two renowned physicians, *Paulus Barbette* and *Willem Piso*, but especially *Swammerdam*, who was shortly afterwards to acquire such universal fame. These four months which *Steno* spent in Amsterdam, however, derived their chief importance from the fact that, on April 7, 1660, he made his first anatomical discovery, in that he found the parotid duct, called after him *ductus Stenonianus*. Though this discovery beyond all doubt is due to *Steno*, *Blaes* neverthe-

less attempted to appropriate it, and *Steno*, who had already spoken of it as his own, thought himself branded as an imposter, and for the sake of his honour felt obliged to vindicate himself. This caused a bitter controversy, which lasted for the next three years. It has been so thoroughly discussed by *Gosch* that there is no reason to go into details about it here. The inequality of the contest will at first sight be apparent to anybody: on one side the highly respected professor with his numerous, influential friends; on the other side the unknown foreign student, twenty-two years of age. And *Blaes* certainly made the most of all his advantages; he backed the controversy with the whole of his authority; he made use of testimonials from his relatives and students; nay, he even induced a professor in Utrecht, *Nicolaas Hoboken*, who had no qualifications whatsoever to act as judge in the matter, to publish a pamphlet against *Steno*, which contained nothing but loose assertions, accusations and insults. To this *Steno* replied in a manner which reflected the greatest honour upon himself. He never swerved from actual facts, but proved in a tranquil and objective manner that he was right and *Blaes* was wrong; and though there is no doubt that he was deeply hurt by *Blaes'* accusations, he never for a moment let himself be carried away to any harsh or offensive remark. The controversy ended at last with a kind of reconciliation: *Steno* at the request of his friends left a final, decisive pamphlet against *Blaes* unpublished, and the latter on his side one day received *Steno* in his house.

It is worth while noticing that *Steno* in reality was not the first observer of the parotid duct, which had, in fact, been found as early as 1655 by *Needham*, who, however, did not publish his discovery till 1667.

While this was going on, *Steno* was no longer in Amsterdam. After a stay which had, as mentioned above, only lasted four months, he left for Leyden, where he carried on his studies under *Sylvius* and *van Horne*. *Franciscus de la Boë Sylvius*, an able physician and clinician who demonstrated patients to his students, was of great importance in the development of the science of chemistry, especially that of physiological chemistry, as well as in the study of the brain and the glands. His talents, his catching energy, his enthusiasm and his power of expressing himself clearly, as well as his many amiable qualities made a strong impression upon *Steno*, which is evident from the frequent mention he makes of *Sylvius*, even many years afterwards. With *Sylvius* as well as with his other teacher, *van Horne*, a celebrated surgeon and anatomist, *Steno* was at that time most intimately connected. The fact is that all the important discoveries, which *Steno* made during his stay of nearly four years in Leyden, had already secured him many friends and admirers. He was admired as an able dissector, but still more for his capability of making new ob-

Leyden
1660-1664.

servations, though perhaps most of all for his power of drawing sound, far-reaching, often ingenious conclusions from the observations made; while at the same time he was loved for his modesty, his kindness, his upright way of thinking and his candour.

Besides these two teachers of his and Swammerdam, who had also gone to Leyden, there were other well-known scholars, who belonged to Steno's most intimate circle. Of the latter may be mentioned his former teacher, now his friend, *Ole Borch*, who made a long stay in Leyden, and *Matthias Jacobæus*, a young Dane of the same age as Steno, the son of *Jacob Matthiesen*, who after having been professor in Copenhagen had been made Bishop of Aarhus in Jutland. In Leyden Steno also made the acquaintance of one more countryman, which acquaintance, though at the time it seemed only temporary, was later on to be renewed under quite different circumstances. This countryman of Steno's was *Peter Schumacher*, who was then merely a young student, but who was afterwards to become the famous and unhappy High Chancellor of Denmark, Count *Griffenfeldt*. Among the Dutch scholars with whom Steno was most in contact during his stay in Leyden, must be mentioned the highly gifted *Jacob Golius*, who besides being an able mathematician was a great traveller, known for his knowledge of Arabian, Turkish and Persian. He was Professor of Arabian and Mathematics in Leyden, and, no doubt, it was to him that Steno essentially owed his knowledge of languages, for instance Arabian, as well as of mathematics, which branch of science attracted Steno so much that, for a time, he thought of devoting himself exclusively to the study of mathematics, or more particularly of geometry. Finally we may mention Steno's intimate friendship with *Benedict Spinoza*, who during this period was living outside Leyden in Rijnsburg, but the religious views of the two men diverging more and more this friendship was destined to be of no long duration.

The many notable men, who during these years were connected with Steno by ties of friendship, were however not the only factors contributing towards his development; of great importance were also those, who acted as his scientific, sometimes even his personal, adversaries. Among these *Blaes* plays the most prominent part, and Steno later on looked upon his controversy with *Blaes* as a link in his religious development. Besides him some others must also be mentioned: *Bils*, *Deusing* and *Everaerts*. — *Lodevijk de Bils* was a well-to-do, but not very cultured amateur anatomist, who at that time enjoyed a great reputation, chiefly because he pretended to have found a way of embalming dead bodies so as to keep them for ever in a perfect state of preservation, for which discovery he demanded the sum of 150,000 florins. He also made believe that he had a trick of

his own, by which he was able to perform vivisections without bleeding. *Steno* spent much time — too much time in our opinion — to prove the incorrectness of the assertions of *Bils* and of the theories set forth by him concerning the flow and function of the chyle and the lymph. — As a follower and defender of *Bils* may be mentioned *Deusing*, a learned professor of Groningen, known for his passion for writing as well as for his quarrelsomeness, who though he himself is said never to have made a single anatomical observation — in fact he was more of a philologist — yet published a treatise in defence of *Bils*, directed against *Steno*. — And lastly *Bils* found another advocate, and *Steno* another adversary, in *Anthony Everaerts* (*Everardi*), a pupil of *Deusing* and a physician in Middelburg.

One phase of Dutch mental life, the phase, perhaps, which made the strongest impression upon *Steno* and which became, indeed, of the greatest importance to him later on, was the interest everybody took in religious matters. Contrary to nearly all other countries Holland at that time enjoyed full religious liberty, and its inhabitants belonged to very different creeds and denominations. *Steno*, who was himself a Lutheran, had received his education in a country, where all the inhabitants were of the same faith, and where dissenting opinions were scarcely tolerated. It is unquestionable that these circumstances, which made Holland so different from his native country, together with his constant coming into contact with people of various creeds left their mark upon *Steno's* earnest, religious mind and called forth many new reflections upon religious matters.

Family affairs compelled *Steno* to return to Copenhagen in the spring of 1664. His stepfather had recently died, and his mother, who was dangerously ill, died shortly afterwards. Even at this early period *Steno* enjoyed a great reputation in his native town, and one of his principal works, which appeared about this time in Copenhagen and the same year in Amsterdam, was dedicated to *Frederik III.*, the King of Denmark, to whom *Steno* at an earlier date had been warmly recommended by *Thomas Bartholin*. There was just then a very good opportunity of connecting *Steno* with the University of Copenhagen, and he himself surely expected to become a professor; but *Bartholin*, who otherwise took a very warm interest in the success and progress of his branch of science, was at the same time of the opinion — in other cases as it seems quite justly — that the best way of promoting it was by making members of his own family occupy the public positions. So the professorship was not given to *Steno*, but to *Bartholin's* nephew, the above-mentioned *Matthias Jacobæus*. This injustice was a severe blow to *Steno*; and in the autumn of the same year he left Copenhagen.

By Amsterdam and Cologne, where he had a conversation with a

Copenhagen 1664.

Paris 1664
—1665.

Jesuit concerning Protestantism and Catholicism, which revived his interest in religious matters, *Steno* went to Paris, where his fame as a natural philosopher had gone before him, and where he was received with the greatest kindness and cordiality. *Thévenot*, the distinguished supporter of the various branches of natural science and the founder of the French Academy, very kindly took care of him, helped him to get subjects for his anatomical and physiological researches, introduced him into the best circles of the capital and even invited him to live in his own house. *Steno* met there his friend *Swammerdam*, who also was a guest of *Thévenot's*. *Steno* and *Swammerdam* were both of them amiable, straightforward and honest young men, equally enthusiastic about the study of natural science, and though *Swammerdam's* interests were more particularly confined to the morphology and biology of the lower animals, his studies being thus to some extent remote from what were the chief objects of *Steno's* researches, yet the two friends collaborated in two or three series of investigations. It was also in Paris, before an audience of interested scholars, who met at the house of *Thévenot*, that *Steno* delivered his famous discourse on the anatomy and physiology of the brain. — But in Paris, no more than in any other place, did he exclusively seek the scientific circles; he associated with many people of different interests, especially with catholic divines and people connected with them. Thus *Steno* is known to have been debating religious problems, among others with *Elisabeth Rantzau* (*Deo sacrata Rantzovia*), the widow of *Josias Rantzau*, Marshal of France, who herself had taken the veil and founded a nunnery of the order of the *Annunciata*.

Florence
1665—
1668.

After having visited several towns in France, about which voyage little or nothing is known, *Steno* left for Italy, arriving in Florence in the summer of 1665. The letters of introduction, which he brought from *Thévenot*, his fame and prepossessing appearance made all doors open to him, and he soon felt quite at home in this city, which, as the years went on, he learned to love more and more. The Grand Duke of Tuscany, *Ferdinand II*, in various ways attached *Steno* to his court, partly by securing him a good income that he might live without cares, partly by procuring him materials for investigation and the opportunity of carrying out his researches.

These first years in Florence were the happiest years of *Steno's* life. He was honoured and liked, he felt that he was among friends, and he loved the city and country in which he was living. He eagerly took part in the social life of the town, felt happy and free of cares, and his most important scientific works appeared during this period.

It would take too long to give a detailed account of all the eminent men, with whom *Steno* became acquainted, and to whom he attached himself during these years. We will only briefly, and with

no definite plan, dwell upon those, who in one way or another were of importance to the development of *Steno* during this period. There was *Vincenzo Viviani*, the pupil and biographer of *Galilei* and closely connected with the Grand-Duke's court, who besides being a theoretical mathematician of note spent his time, not only in scientific experiments, but also in works of practical purpose, the building of forts, the regulation of rivers &c. He was an uncommonly gifted scholar, lively and enthusiastic, jealous and inconstant, but his friendship for *Steno* was sincere and unbroken. There was also *Carlo Dati*, who studied natural science and literature and was universally praised for his kindness to all who came into contact with him. Further there was *Francesco Redi*, who later became Physician in Ordinary to the Grand-Duke; he distinguished himself as a poet as well as by his studies of natural science and languages, and was, by nature, a kind and modest man, loved by all.

Of the Florentines, who in those days enjoyed a great reputation, the one who came in closest contact with *Steno* was, perhaps, Count *Lorenzo Magalotti*. The last scion of an ancient noble Roman family and educated by the Jesuits at Rome he was a young man of incredible natural gifts combined with a vivid interest in all branches of science, his knowledge ranging from astronomy to anatomy, from theology to mathematics and even embracing numerous languages, European as well as Oriental. He had an exceeding charm of manner, was ambitious, a zealous Catholic and passionately attached to *Steno*. For a while he was the Secretary of the *Accademia del Cimento*, later on he was appointed the Ambassador of *Cosimo III* in Vienna. Among other scholars, whom *Steno* met and made friends with during these years, was *Marcello Malpighi*, the excellent anatomist, who, it is true, never resided in Florence itself, but with whom *Steno* nevertheless for a long time kept up a constant intercourse, which was all the more natural as the researches made by these two natural philosophers often touched one another.

During these years, spent at the court of the Grand-Duke, *Steno* not only lived in Florence; he also accompanied his patron on his tours to various parts of Tuscany, which tours, among other things, gave *Steno* the opportunity of making those researches concerning the geology of the country, which more than anything else have contributed to his fame. But while engaged in these examinations and associating with friends, like himself interested in natural science, he was constantly brooding over the problem, which more and more took hold of him: the question of Protestantism versus Catholicism. It would carry us too far, if we here were to examine closely this side of *Steno's* development. We have already hinted at his natural readiness to take up this question, and how his stay in Holland and

Paris gave him ample opportunities for discussing religious problems. In Florence the same questions were, for many reasons, brought still nearer to him. Besides his above-mentioned friends, whose endeavours to win him over to Catholicism were perhaps only indirect, he had other friends of either sex, whose chief aim was to bring about his conversion. Among the latter, especially deserving to be mentioned, are *Maria Flavia*, an elderly nun of an ancient, distinguished Florentine family, and *Lavinia Felice Cenami Arnolfini*, married to *Silvestro Arnolfini*, the Ambassador of Lucca in Florence. To the latter, who is described as a refined, intelligent and zealous lady, together with *Pater Emilio Savignani* the conversion of *Steno* was chiefly due; and in December 1667 he definitely renounced the protestant religion. *Steno* was surely perfectly honest and sincere in his change of faith, and also some of those, who worked for his conversion have, no doubt, acted solely in view of the salvation of his soul; but to many the most important feature of the case was the triumph it would mean to the Catholic Church, if it were to win over a man of *Steno's* reputation, and they naturally felt confident that he would wish and also be able to apply his great gifts in the service of the Church of Rome.

On the very day when he renounced his protestant faith *Steno* received a letter, in which the Danish King summoned him home, holding forth at the same time the promise of a post at the University of Copenhagen.

Steno, however, did not set off at once; there was much to retain him in Italy; moreover he had to inform the Danish government of his change of faith in order to obtain liberty of worship. While waiting for the settling of this matter he composed a brief *Prodromus* on the contents of the great work, which he intended to write, and which was to be based upon the above-mentioned observations of the geological conditions of Tuscany. This brief, preliminary record is, no doubt, *Steno's* most ingenious work, abounding as it is with acute observations and with still more acute conclusions and generalizations. It was finished in 1668 and published in 1669, but the great work, the forerunner of which it was intended to be, never appeared, perhaps because *Steno* felt too divided in mind. During the first years after his conversion his interests in religious and scientific matters are evidently at war, and though he makes some minor researches and writes a series of small papers, these works, which are able enough in themselves, are yet almost entirely lacking that ingenuity, in which most of his earlier works abound.

It was thus not until a year after *Steno* had been called back to Copenhagen that he left Florence, and then only for Rome and Naples, from where he set out northwards. In the spring of 1669 we find *Steno*, first in Murano, then in Innsbruck; late in the summer he

Rome and
Naples 1668.
Murano,
Innsbruck,

was in Vienna, afterwards in Prague, and in the spring of 1670 in Amsterdam, where he remained till early in June. But *Steno* did not feel at home there, as he had done before; his change of faith had estranged him from his former friends and at the same time involved him in various conflicts with the Protestants. *Frederik III*, who had summoned *Steno* back to Denmark, had died in February in the same year, and this together with an invitation to go back to Florence, because *Ferdinand II* was dangerously ill, made *Steno* give up his intended voyage to Denmark and return to Florence instead. *Ferdinand II*, however, had died before *Steno's* return, but *Cosimo III*, a great patron of all branches of science and moreover a deeply religious man, received him, if possible, in a still more friendly way than his father had done, encouraged him to carry out his intended geological work, and provided him with employment by making him arrange the large collection of minerals in the Pitti Palace. This time *Steno* stayed in Florence for two years, though, as before, he travelled about a good deal, examining, for instance, in the summer of 1671 two grottos in the Alps at Gresta and Moncodine, but with the exception of two short Letters to the Grand Duke about his discoveries in these grottos no scientific works exist from the hands of *Steno* during these years.

Prague
1669. Am-
sterdam
1670.

Florence
1670—
1672.

Early in 1672 *Steno* received a second summons home, worded in the same terms as the one he had received four years and a half ago. *Steno* obeyed the order and left for Copenhagen, where he arrived in the course of the summer. The time of his return seemed in every respect a favourable one. Anatomy had of late years been neglected at the University of Copenhagen, and it fell to *Steno* to re-open the *Theatrum Anatomicum* and make many anatomical demonstrations, private and public, which here too aroused the liveliest admiration in those interested in natural science. Besides, *Thomas Bartholin* just then commenced the publication of his famous periodical, the *Acta Medica Et Philosophica Hafniensia*, in which *Steno* had a good opportunity of publishing his observations. But in one more respect the time of *Steno's* return seemed a favourable one, as a more tolerant attitude towards the Catholics was beginning to make itself felt, especially through the influence of *Griffenfeldt*. This change of attitude was, however, as yet not very strong in its results. Thus *Steno* could not become a professor at the University, for which reason he received the title of *Anatomicus Regius*, and though left in peace by most people he was attacked in a rough and reckless manner by some of his compatriots, so that his stay in his native town was anything but pleasant to him. At this period *Steno's* mind was more than ever divided between religion and science, and his publications consisted partly of replies to attacks directed against him from the Protestants,

Copenha-
gen 1672—
1674.

partly of descriptions of some of those animals, which he had dissected, and, last not least, of the splendid address, which he delivered at the re-opening of the anatomical theatre. But he never published any descriptions of the majority of his dissections. Some of them were, it is true, described by others in the *Acta Hafniensia*, but many are only known through brief notes written down by *Holger Jacobæus*, the brother of *Steno's* above-mentioned friend, *Matthias Jacobæus*, at that time *Steno's* dearest pupil and later Professor at the University of Copenhagen.

After this time no scientific work whatsoever appeared from the hands of *Steno*.

At length the stay in Copenhagen became too painful to *Steno*; he sent in his resignation, and after it had been accepted, he immediately left the country. By way of Hanover, where he paid a visit to the Duke, *Johann Friedrich*, likewise a convert to Catholicism, he went to Amsterdam, and from there to Florence, where he arrived about Christmas, 1674, and where he became the tutor of the son of *Cosimo III*. He probably altogether abandoned the study of natural science, being now entirely absorbed in his own relation to religious problems, and occupying himself with the writing of theological tracts and polemical pamphlets, among which his well-known letter to *Spinoza*, to which the latter never replied. It may be said of this letter of *Steno's*, as well as of all his religious writings, that they have the same spontaneity, the same subjectivity and the same general impression of being founded upon a direct observation of the phenomena, which we observed in his writings on natural science. But while these qualities made the strength of *Steno* the scientist, and to some extent also of *Steno* the Catholic, they prevented *Steno* from ever becoming, what some of his friends had hoped he would become, an eminent theologian. In the autumn of 1675 *Steno* finally took Holy Orders, and henceforward he devoted his life exclusively to the cause of the Roman Church, and met with an ever-increasing admiration in Florence, the sincerity of his pious life being looked upon with general veneration. He often tried to convert foreign Protestants, who visited the city, in many cases not without success. But *Steno* went further in his demands upon himself, and more especially he blamed himself because, during the first years after his conversion, he had been devoting part of his time to other things besides the service of God and the Catholic Church.

Two years after his return to Florence *Steno* was appointed Bishop of *Titiopolis in partibus infidelium* and Vicar Apostolic of Northern Germany and Scandinavia. He went to live in Hanover, the residence of the above-mentioned Duke *Johann Friedrich*, where he worked zealously for the cause of Catholicism, bringing about many conver-

Florence
1674—
1677.

Hanover
1677—
1680.

sions. He lived a very frugal life, spending all he could spare to help the poor, and sacrificing his time and his strength in the cause of religion. In the early winter of 1679 *Johann Friedrich* died, being succeeded by his Protestant brother, *Ernst August*. It now became impossible for *Steno* to remain any longer in Hanover, and in the spring of 1680 he settled in Munster as the Suffragan Bishop of the Bishop of Munster, *Ferdinand*, Baron von Fürstenberg. His income was not so large as it had been in Hanover, so he sold all his property and lived still more frugally in order to be able to help the poor, especially those lately converted to Catholicism. He performed numerous divine services, made troublesome journeys round the neighbourhood and fasted strictly. By his pious life he also here succeeded in impressing many people; the admiration for him increased, but with it the envy, and by his extreme zeal he made numerous enemies.

Munster
1680—
1683.

When *Steno* had lived for three years in Munster, the Bishop died; so he left and went to Hamburg, which likewise belonged to his vicariate. He lived there for two years, in the utmost poverty. He kept no servants, he fasted most of the days of the week and wore ragged and filthy clothes. He did nothing to live up to his rank, did not even wear his clerical suit and spent everything on the poor, working so ardently for the benefit of Catholicism that he made himself hated even by the Catholics, who threatened to cut off his ears and drive him from the town as a criminal.

Hamburg
1683—
1685.

To further minister the cause of his Church *Steno* left Hamburg for Schwerin, where he worked under circumstances, which were, if possible, still more distressing, and here he died in unspeakable misery, forty-eight years old. The Grand-Duke of Tuscany had his body conveyed to Florence, where it was deposited in the crypt of St. Lorenzo.

Schwerin
1685—
1686.

II

As for the material, which *Steno* used as the basis of his researches, he was nearly always indebted to circumstances; he very seldom appears to have chosen it of his own accord. Thus, in his early days in Holland he was reduced to dissect such animals, or parts of animals, which he could get in the cheapest and easiest way. Later on in Florence *Steno* generally made his examinations on animals, which the Grand-Duke thought curious and therefore sent to him; or he made his geological researches in parts, to where he came in the train of the Grand-Duke. Also during the two years, which *Steno* spent in Copenhagen as *Anatomicus Regius*, he again had to use the material, which chance offered to him. Partly because his material was genes

rally not of his own choosing and therefore in itself limited, partly because he was so frequently interrupted by external circumstances, *Steno* hardly ever pursued the problem, which had raised his interest, until he came so near solving it, as was at all possible; on the contrary he broke off his investigation of a problem, in some cases even several times, to return to it, when he had the opportunity of doing so. This accounts for the fact that so few of his publications are complete in themselves; they nearly always appeared as the continuations of previous works or as the beginnings of works to come. For that reason the contents of his writings will be analyzed in the following pages, not in the succession in which he published them, but according as the several parts of his publications are connected with one another by the nature of the questions he attempted to solve. It is a matter of course that *Steno* made many examinations and solved many problems, which are either of minor interest or were not directly connected with the questions, to which he more especially devoted himself. These latter can be divided into different groups, the most important of which are: The Glands, the Lymphatic System, the Heart, the Muscles, the Development of the Embryo, the Sexual Organs, the Fishes, and in the case of all these groups both the anatomical and physiological sides of the questions. There are, moreover, subjects which — only apparently, however — are remote from these: the Occurrence and Development of Fossils and Crystals, and the Origin of the Strata of the Earth.

Before going into a detailed account of what were *Steno's* contributions to the various groups in question, we will in a few words draw attention to some phases of his personality as a man of science, phases in which he differed from most of the scientists of his time. Not only in his ingenuity, which was greater, fresher and more spontaneous than that of the majority, did he surpass most of his contemporaries in the scientific world and, without exaggeration, inscribe his name among those of the greatest men of his day; not only on the strength of his unusual powers did he distinguish himself; it was perhaps above all through his scientific method. He asked his questions and gave his answers as a scientist of the twentieth century; and deeply religious though he was, he never for a moment introduced any supernatural element in his solutions of problems of natural science.¹⁾ And while the majority of his contemporaries were, before all, scholars, and,

¹⁾ From about the time when *Steno* took Holy Orders his development retrograded, even as far as his way of looking at nature was concerned. In his chief geological work (*De Solida Infra Solidum* &c.) when touching upon the questions of rock-crystals, gems, precious and base metals, he had exclusively dealt with their formation and occurrence, but when he later on mentioned these very things in a sermon, he merely considered them from a religious point of view, dwelling on how their symbolic meaning was to be looked upon by mankind. See *Stenonis Nicolai Opera Medicæ Palat. 36, Sermo XL* in R. Biblioteca Laurenziana in Florence.

because they relied so implicitly upon researches made by those who had gone before them, perhaps did not always make such observations as were before their very eyes, *Steno*, together with the best of his age, *Harvey*, *Sylvius*, *Borelli*, *Malpighi* and *Swammerdam*, was first and foremost an observer and an experimentalist. He observed the phenomena in a calm, unprejudiced and natural manner and thus discovered what, because of their preconceived ideas, most of his contemporaries had failed to see. The number of new and important discoveries, which are due to *Steno*, is exceedingly great, and yet we do not here find the full expression either of his talent or of his significance. His genius reveals itself in the conclusions, which he draws from his discoveries, and in the generalizations which he makes. His conclusions are not only astonishing by their number, but still more by their soundness and clearness, and yet perhaps most of all admirable by their correctness and their scope, being such that in some cases they have not been fully appreciated until now, some two hundred and fifty years after their first appearance. Still there is one fact, which may perhaps help to throw further light on *Steno's* scientific personality. At a time when most natural philosophers were, before all, physicians who looked upon natural science as the auxiliary of medicine, *Steno* himself never practised as a physician, and in his researches very rarely touched upon questions of a purely medical character.

As mentioned above, *Steno* made his first discovery in Amsterdam on April 7, 1660, when, being engaged in dissecting the head of a sheep, he found the parotid duct. He called *Blaes*, who declared not to know this duct and referred him to *Wharton's* work on the glands, published in 1656. As *Steno* neither here nor anywhere else found any positive information concerning this question, he continued his investigations, and when shortly afterwards he went to Leyden, he showed his discovery to *Sylvius* and *van Horne*, of whom the former was the first to find the parotid duct in man, the latter the first to demonstrate it in public, naming it after *Steno*.

*The
Glands and
the Lym-
phatic Sys-
tem.*

Through this first discovery of his *Steno* was led to study the anatomy and physiology of the glands and the lymphatic system. With regard to the glands *Steno* found in the first place that, what had hitherto been called the parotis, had really to be distinguished as two separate glands, of which the one secreted saliva through the duct found by him, and the other, an ordinary lymphatic gland, belonged to the lymphatic system. The former of these *Steno* classed among *Sylvius' glandulæ conglomeratæ*, the latter among his *glandulæ conglobatæ*. Furthermore he found that lymphatics were running from parotis conglomerata to parotis conglobata, and that another lymphatic vessel ran to a gland lying further below, his *glandula communis*, which received vessels also from a conglobate gland close to the sub-

maxillary gland, and from one of the same kind near the tonsils. Leading from this *glandula communis* was a fourth vessel, which together with the other lymphatic vessels of the head opened into the vena cava at the place, where the jugular and axillary veins joined. This discovery was particularly interesting, because it showed that the lymph was conveyed from and not to the salivary glands, which was entirely at variance with the theory maintained by *Bils* and other of *Steno's* contemporaries, viz. that all the watery secretions and humors came from the thoracic duct. By this discovery *Steno* was involved in a controversy, not with *Bils* himself, but with *Deusing*, according to whom there were also other ways, in which the saliva could be secreted, e. g., during excessive salivation, by the direct flowing down of the watery fluid of the brain into the cavity of the mouth through the apertures in the sphenoid bone. In his Dissertation *Steno* on the contrary maintained that the arterial blood must be supposed to be of such a composition, as to be able to provide materials for the saliva, which, through the influence of the nerves, is secreted by the glands, by means of a process, which might be conceived as a temporary constriction of the minute blood-vessels, in which manner a mechanical hindrance was made for the passage of the blood, which would then give off its more watery elements. — Against *Everaerts* who, as related above, likewise agreed with *Bils* in his view of the function of the lymph, being of the opinion that the lymph was conveyed direct to the mammae, to be there secreted as milk, *Steno* strongly asserted that the mammae were glands, and that they secreted milk in a manner analogous to that in which the salivary glands secreted the saliva.

Steno's next researches concerning glands turned upon the lachrymal glands. Even *Wharton* thought that the tears originated in the brain, from where they passed through the nerves, and that their flowing was due to a contraction of the brain, which occasioned the tears to be squeezed out, the tears subsequently passing through the nerves and through minute apertures in the eye, while the normal function of the lachrymal glands was to receive this humor from the nerves. *Steno* discovered the minute ducts of the lachrymal glands and immediately gave the one correct explanation of the secretion of the tears, when he maintained that the tears were the produce of the lachrymal glands and had their origin from the arterial blood through the influence of the nerves on the glands; that the normal function of the lachrymal fluid was to keep the surface of the eye and eyelids smooth, and that this fluid afterwards passed through the puncta lacrymalia, the lacrymal canals, which have also first been observed by *Steno*, and through the naso-lachrymal ducts to the nose, which passage was only insufficient, when the lachrymal fluid was secreted in excessive abundance, e. g. during the process of weeping. Finally it is worth

mentioning, that *Steno* in the same Treatise also asserted the cerumen to be a glandulous secretion, the glands in question lying between the skin and the cartilage.

From the observation that the membranes of living animals are always humid, *Steno* was led to the theory that these membranes owe their humidity to glands; and setting to work to find glands in the nose, he discovered them in great abundance below the mucuous membrane. But besides this infinite number of small glands he discovered in the sheep and in the dog a large, separate conglomerate nasal gland, and furthermore remembering how channels had been provided for carrying away the fluid of the eye, *Steno* looked for a passage into the mouth, and found that the *canales naso-palatini*, sometimes called *canales Stenoniani*, might serve this end in about the same manner as the anterior and posterior apertures of the cavity of the nose. As to the sweat *Steno* stated that it too was a glandular secretion.

After a short interval, during which he occupied himself with other problems, *Steno* once more returned to the glands. He pointed out, how all the conglobate glands belong to the lymphatic system, looking upon the latter as consisting of conglobate glands and lymphatic vessels; but, erroneously, he also made those of the conglomerate glands, which secrete a watery fluid, together with their ducts, belong to this same system.

As the essential results of his investigations up to this date *Steno* had established the following facts: 1) that all lymphatic vessels are connected with glands, the place of formation of the lymph being unknown; 2) that some of the lymphatics belonging to the conglomerate glands, *i. e.* the excretory ducts of these glands, carry their secretion to the cavities of the body: the eyes, the ears, the nose, the mouth, the gullet, the throat & c.; 3) that the lymphatic vessels belonging to the conglobate glands, those now called the lymphatics, all carry their contents back to the venous system, either direct or through other conglobate glands; and 4) that all glands are organs to which and from which lymphatic vessels are running. On the strength of his researches, and in continuation of what has already been mentioned, *Steno* further stated that not only do all conglomerate glands evacuate their fluids into the cavities of the body, but that wherever in the natural state a fluid is found on a surface, it has its origin from such glands. To those fluids he referred the following: 1) the fluid in the pericardium; 2) the sweat; 3) the fluid in the cavities of the brain; 4) the fluid on the surface of the organs of the thoracic and the abdominal cavities; and 5) the fluid by which the fetus is nourished, and which he supposed to be secreted in the placenta from the maternal blood, chiefly because he had succeeded in separating, without bleeding, the fetus from the wall of the uterus of a cat. It was the

villi of the placenta and of the wall of the uterus, which he considered to be what he termed the *eminentiæ glandulosæ*. Steno himself enumerates his discoveries as follows: 1. *Vas salivare exterius sive parotidum vas*. 2. *Vasa buccarum*. 3. *Vasa sublingualia minora*. 4. *Vasa palati*. 5. *Meatus anterior e naribus in palatum*. 6. *Vasa epiglottidis*. 7. *Vas narium*. 8. *Vas narium ovibus peculiare*. 9. *Viæ a palpebris in nares*. 10. *Vasa palpebrarum seu lacrymalia*. 11. *Vasa raje superficiem exteriorem lubricantia*. As regards two important, larger glands Steno has thus for the first time acknowledged them to be glands; he has discovered several excretory ducts and furthermore shown the existence of canals along which the various secretions are conveyed to the great cavities of the organism; he has demonstrated that the secretion depends upon the supply of blood and upon the nervous system; and further, in the case of a number of small glands, he has shown the existence of these glands and explained their significance, pointing out how the fluid, which covers animal membranes, has not simply passed through these membranes, but has been secreted by numerous small glands of their own.

In addition to the above-mentioned glands Steno in a fish, the ray, found the glands of the skin, which give to these animals their lubricity. In the same specimen he also found the minute glands of the stomach and the intestine. It is also of interest to note — as appears from a MS. of the above-mentioned *Holger Jacobæus* — that at a dissection in 1673 Steno demonstrated those glands in the small intestine, which Peyer found in the same year, although he did not publish his discovery until four years later.

The Heart
and the
Muscles.

By observing that the portion of the vena cava, which is nearest the heart, possessed independent contraction, which contraction, in animals laid open by vivisection, continued long after the pulsation of the heart had ceased, Steno was led to a close investigation of the heart and its function.

Even after Harvey's discovery of the circulation of the blood, the views concerning the importance of the heart to the organism were very much at variance, and numerous explanations of its function had, in reality, only this one thing in common that they were alike fanciful and alike far from being consistent with the actual facts. Steno was among the first, who reduced the existing chaos to clearness and order. In a Letter, dated Leyden ult. April. 1663, which he wrote to Thomas Bartholin, he told in few and simple words, that in his opinion the heart was a muscle and nothing but a muscle, and he expressed the hope that he would soon be able to prove this statement: *Quod substantiam cordis spectat: evidenter, ut opinor, demonstratum dabo, nihil in corde reperiri, quod non reperiatur in musculo, nec in corde desiderari, quod in musculo invenitur, si illa respexeris, quæ ad musculi faciunt*

essentiam, id quod & de auriculis patebit verum, &c. Bartholin was far from admitting the correctness of Steno's view. Hippocrates himself, it is true, had already called the heart a muscle; but at Steno's time this view was completely overshadowed by that of Galen, and Steno was quite aware that his assertion would be received with the strongest opposition. He was likewise aware that it was not sufficient to make an assertion, but that a proof of its correctness might justly be claimed, and so he went the way of investigating the anatomy and physiology of the ordinary muscles, afterwards comparing the results of his researches with those attained by an examination of the anatomy and physiology of the heart. As early as in the year after he had written his Letter to Bartholin, Steno published his first Treatise on the muscles. He begins his Treatise by mentioning the anatomy and physiology of some particular muscles, first of all the respiratory ones; he corrects some errors in the current view of the latter, explains various phenomena, and gives their name to the levatores costarum muscles. Then he shows that the tongue does not, as was generally supposed, consist of a substance of its own, neither is it a gland, as Wharton among others maintained, but it is altogether made of muscular fibres, the course of which he describes. He also describes the two spirals of the muscular fibres, which cross in the œsophagus of the mammals. Proceeding to speak of the general anatomy and physiology of the muscles, Steno furthermore says that the muscles do not, as was then generally supposed, consist of a parenchyma, caro, and muscular fibres, but are entirely made of fibres, to which must only be added arteries, veins, nerves and thin layers of fibrous tissue. The fibres, *fibræ motrices*, he again divides into fibrils, *fibrillæ minutissimæ*, and every muscular fibre, according to his opinion, is continued at either end of the muscle in a tendinous fibre, so that every one of the tendons belonging to a muscle has a number of tendinous fibres corresponding with the number of muscular fibres in the muscle. But when examining the heart Steno here also found nothing but muscular fibres (terminating in tendinous fibres), vessels, nerves and some connective tissue; and having found that also in the heart the function of these fibres was contraction, he concluded that the heart itself was a muscle and nothing but a muscle. Moreover Steno very carefully examined the course of the fibres in the heart, found the bending of the fibres at the apex and the different degree of obliquity of the different layers of fibres, which results were shortly afterwards carried further by Borelli. Finally Steno maintained that the fact of the contraction of the heart not being voluntary cannot be used as an argument against the heart's being a muscle, because many muscles, universally recognized as such, contract involuntarily. In thus showing what the heart is, Steno at the same time showed what it is not. He says himself: *Non erit cor amplius sui*

generis substantia, adeoque nec certæ substantiæ, ut ignis, calidi innati, animæ sedes, nec certi humoris, ut sanguinis, generator, nec spirituum quorundam, vitalium puta, productor.

Steno's interest in the general anatomy and physiology of the muscles visibly showed itself in a more extensive work on this subject, which work he himself seems to have valued highly, but which is, perhaps, now considered the weakest of his writings. The underlying idea, however, is in itself highly praiseworthy. His point of view was that all previous explanations as to the way in which the contraction of the muscles took place were very improbable and, which was still worse, very vague and obscure, and so he made it his aim to introduce the exact mathematical method into the investigation and explanation of the contraction of the muscles. Steno took a great interest in mathematics, in which branch of science he possessed considerable knowledge, and he was of the opinion that mathematics might be applied in physiology and become of as great importance there, as it already was in other branches of science, e. g. astronomy. About the same time the same idea had led Borelli to occupy himself with bringing mathematics to bear upon the more mechanical side of the function of the muscles. Steno wanted to utilize the mathematical laws to explain how the very contraction of the muscle took place. He justly looked upon the muscular fibre as the elementary part, the function of which, during the contraction, it was particularly important to become acquainted with. When in spite of much diligence and the most careful proofs he still did not arrive at a correct result, this was due to the following two errors. Firstly his starting-point was a wrong conception of the course of the muscular fibres. As has been already mentioned he thought that every muscular fibre at either end passed into a tendinous fibre, and he furthermore was of opinion that the course of the muscular, as well as that of the tendinous fibre were each of them rectilinear, forming an angle at the two places, where the muscular fibre became a tendinous one, neither of which suppositions have proved to agree with the actual facts. Secondly, he did not pay attention to the fact that every separate muscular fibre, when shortened by contraction, must needs become thicker, and that this in its turn must act on the whole figure of the muscle during the contraction.

Steno's interest in the special anatomy of the muscles displayed itself some years afterwards in his thorough description of the muscles of an eagle, which he dissected during his stay in Copenhagen in 1673.

Further we must mention the experiment, which still bears Steno's name, and which consisted in his ligaturing the descending aorta of a living animal, the consequence of which was a paralysis of the hind-legs, which paralysis ceased when the ligature was removed.

Finally *Steno* was the first to show that contraction of a muscle might occur not only by stimulation of its nerve, but also by stimulation of the muscle itself.

At an early period *Steno* became interested in the study of the brain. *The Brain.* This is evident from a Letter to *Thomas Bartholin*, dated March 1663, in which he speaks about his having made numerous dissections of this organ, adding that what he found through these dissections was in every respect inconsistent with what *Descartes* taught about the brain. It is quite natural that *Steno* should become interested in the study of this organ. He was a pupil and friend of *Sylvius*, with whom he was almost in daily intercourse, and *Descartes' De Homine*, which had just appeared, had made an enormous sensation. It is easy to understand that *Steno*, when first mentioning *Descartes*, takes up a critical position towards this work, and more especially towards that part of it which deals with the brain. *Steno* clearly saw that nearly all the anatomical descriptions and physiological explanations of *Descartes'* were quite erroneous, and he was certainly at too close a range to be able to fully understand the idea of this particular work.

The interest *Steno* took in the brain and its function might rationally lead one to suppose that he published his numerous observations on this organ. Strictly speaking this never happened, though during his stay in Paris he delivered a Discourse on the Brain before the assembly of learned men, who met at *Thévenot's*. This Discourse, which scarcely contains a single new observation, he left in Paris when leaving that city, and it was not published till four years after by a Paris bookseller. *Steno* seems purposely to leave the results of his own researches out of the question, and when this little work still ranks among his most important ones, it is because it contains instructions concerning the study of the brain in particular, and the study of natural science in general, so intelligent and so sound that an anatomist like *Winslow* — who by the way was a relative and countryman of *Steno's* and like him a convertite to Catholicism — many years afterwards admits, *que le seul Discours de feu M. Stenon sur l'Anatomie du Cerveau, a été la source primitive & le modele general de toute ma conduite dans les travaux Anatomiques*, and even goes so far as to reprint the whole of the Discourse in all editions of his famous Anatomy. Much of *Steno's* Discourse was, in fact, of so far-sighted a nature that it was not till many years after *Winslow's* time, partly not till our own age, that scientists were able to follow the instructions given by *Steno*. It would carry us too far to give any detailed account of the Treatise; but in order to duly appreciate it, it will be necessary to remind the reader of the views current in the days of *Steno* concerning the brain and its function. The anatomical observations of the brain were still rather rudimentary, and its physiology was greatly based on

sheer fancy. Any intimate knowledge of the more minute structure of the brain was, of course, quite out of the question; it was hardly known that the substance of the brain at some places was made up of fibres, and there was an absolute ignorance of its being so everywhere. As to the different theories concerning its function, they were, really, only at variance as to the distribution of the mental faculties in the ventricles of the brain, and as to the part played by the animal spirits. *Descartes* and *Willis* were — each in his own way, and only partly — exceptions to this. That *Steno* did not estimate *Descartes* very highly as an anatomist has already been mentioned, nor was he greatly attracted by *Willis*. A sane observer like *Steno* could not help noticing that, although much in *Willis* was founded on correct observations, much, on the other hand, rested on pretty similes and analogisms, which were to be taken as proofs. Characteristic of *Steno*'s view of the physiology of the brain are the following words, with which his Discourse opens: *Au lieu de vous promettre de contenter votre curiosité, touchant l'Anatomie du Cerveau; ie vous fais icy une confession sincere & publique, que ie n'y connois rien.* He then proceeds to demonstrate that all those self-relying men, who wrote on the brain, knew as little about the matter as he, or rather less, and that all the ideas, which they reckoned with, were only phantoms of their own imagination. Even the very animal spirits, the existence of which at that time was generally acknowledged, he mentions in the following way: *On voit encore moins de certitude, sur le sujet des esprits animaux. Est-ce le sang? seroit-ce vne substance particuliere separée du chyle dans les glandes du mesentere? les serositez n'en seroient-elles points les sources? Il y en a qui les comparent à l'esprit de vin, & l'on peut douter si ce ne seroit point la matiere mesme de la lumiere.* *Steno*, however, is not content with pulling down the old building, he also gives advice, and very good advice indeed, as to the way in which a new building is to be erected. He speaks of the best ways of dissecting the brain; he describes, how the skull is to be opened, the best means of acquiring trustworthy figures of the brain &c. &c. Of far greater importance, however, is his assertion that first of all an effort must be made to determine the course of the fibres in the brain, with which its function to all probability is closely connected. Moreover he says that valuable information might be obtained by comparing the brains of animals, from the lower to the higher, as well as by comparing different stages of the development of the brain in the same animal, from the fetus to the adult individual. Furthermore he refers to all the information to be had from the pathological anatomy of the brain; and finally he recommends experiments on living animals, the brain of which were to be examined, while drugs or poisons were either administered in the ordinary way, or applied direct to the brain.

Only twice more in his subsequent writings *Steno* touched upon the question of the brain. In his description of the dissection of a shark he particularly emphasized the exceeding smallness of the brain, expressing the supposition that many nervous fibres leading to the muscles had their origin, not in the brain, but in the spinal cord. This he maintained, partly because the sum of the transverse sections of all nerves leading to the muscles was far larger than the transverse section of the spinal cord at the bottom of the fourth ventricle, and partly because the cervical and the lumbar enlargements were to be found in vertebrates with four extremities, while no such formations were to be found in vertebrates without extremities. In the same Treatise *Steno* also touched upon other interesting questions concerning the brain; but it would take too long to dwell upon them here.

In his last work upon the brain, treating of a hydrocephalic calf, which he dissected in Innsbruck in 1669, *Steno* mentioned a number of observations on the structure of the brain; he also discussed the origin of the large quantity of fluid, and stated that he was of the opinion that the four ventricles were, in reality, only one single cavity. Finally he called attention to the fact that, though in this case the brain was exceedingly disfigured, both sensation and motion were normal.

In the description of his dissection of a ray *Steno* explicitly dwelt on the peculiar egg-shells of this animal, which were in those days generally looked upon as being the uterus of the animal. *Steno* pointed out how this interpretation was in any case quite untenable; on the whole he was not sure that these formations were really produced by rays; but if they owed their origin to these animals, they could not be their uterus, but must be part of their eggs.

The Reproductive Organs and the Nutrition of the Fetus.

At *Steno's* time natural philosophers were very uncertain as to how the fetus was nourished in the uterus and in the egg. Some thought that it received its food through the mouth, others that it received it through the blood-vessels of the umbilical cord. *Steno's* explanation of this process in placental animals was, as mentioned above, that the fetus was nourished through the placenta by a secretion of the villi, which he looked upon as glands. But once, when dissecting a newly-hatched chicken, he found the vitelline duct and became aware of its conveying the substance of the yolk direct into the intestine. As he had no idea of the existence of such a formation, still less of its function, his surprise was nearly overwhelming. He published this important discovery as his own; but it appears from a passage in a later Treatise that he was reproached with having done this, because, as his detractors maintained, the discovery had already been made by others. Concerning the curious circumstances of this discovery, further particulars will be found in the notes (vol. I p. 263 of the present Edition).

In the description of his dissection of a shark *Steno*, after having

mentioned the reproductive organs, set forth as his opinion, that the organs of the female mammals, in his days invariable named *testes*, were not to be regarded as organs corresponding to the testes of the male mammals; that they were, in fact, the same organs as the ovaries of the oviparous animals; that they produced eggs and consequently ought to be called ovaries. This was quite a new aspect of these organs. *Steno* does not go into details about this discovery, but he adds that he hopes to be able to take up the matter for further treatment at a later period. His thoughts, however, became occupied with many other matters, and he never wrote the intended large work. The fact of his having collected materials for it appears from two small Treatises in *Acta Hafniensia*. The investigations, upon which these Treatises are based, were, no doubt, made in close connection with the work just mentioned, but they were not published till 1675, in which interval — in 1672, five years after *Steno's* first communication — *de Graaf* had published his famous observations, and so he, quite justly, obtained the credit of the discovery of the true nature of the mammalian ovaries. As *Gosch* points out, it is well worth mentioning that *de Graaf's* view was so long in being universally accepted, because it was observed that those formations in the ovaries, which were supposed to be eggs, did not loosen nor were carried away as such, which difficulty would probably have been of less importance, in case it had fallen to *Steno's* lot to promulgate the discovery, for already in his first brief communication he expressed himself as follows: *Non amplius dubito, quin mulierum testes ovario analogi sint, quocunque demum modo ex testibus in uterum sive ipsa ova, sive ovis contenta materia transmittatur &c.*

The two Treatises of *Steno's*, which have just been mentioned, contain much of considerable interest. Suffice it here to call attention to the series of observations on the development of the plagiostomes, which is found in the second Treatise. Already *Aristotle* relates, how in the shark *Galeus laevis* the egg is not only fully developed in the uterus, so that the fish becomes viviparous, but is also fastened to the uterus in a similar way as in the mammals, so that the fetus has both an umbilical cord and a placenta. As far as is known, no one had made this observation between *Aristotle* and *Steno*, who, however, in his communication says nothing of his being acquainted with this passage in *Aristotle*. After having given a more detailed description of other anatomical features of this shark (*Galeus laevis*) *Steno* proceeded to mention another shark (*Acanthias vulgaris*), also viviparous, also in possession of a yolk-sac and vitelline duct, but without a placenta. — Subsequent investigators found no shark with a placenta, until *Johannes Müller* succeeded in finding once more what *Aristotle* and *Steno* had observed. This scientist pointed out that the reason, why others had not

been able to discover what both *Aristotle* and *Steno* had found, was that there is another species of shark, common in the Mediterranean (*Mustelus vulgaris*) and closely related to the *Galeus laevis*, with which it is easily confounded, and this shark, though viviparous, has no placenta.

Finally there is a little Treatise by *Steno* founded on the investigation of a hare, in the one cornu uteri of which was found a fetus partly resorbed, but to the astonishment of *Steno* not putrefied. Hence he concluded that women may hope that dead fetus, which are not born in the natural way, may be resorbed without any putrefaction taking place. The fetus underlying this observation was probably a mummified one.

Steno published a number of minor scattered observations and remarks on anatomical and physiological subjects, among others on the image of the sun in the eye; on the effect of snuff on the eye; on the vesicles, which *Malpighi* found in the lungs; on the liver of over-nourished animals; on the muscular fibres of the membranes surrounding the lungs (of a swan), which he thought were of use in the respiration, &c. &c. It would carry us too far to enter upon these and other questions, as well as on *Steno's* descriptions of the particular dissections of various animals. An exception will only be made, as far as his publications on certain fishes (sharks and rays) are concerned, partly because they are most interesting in themselves, and partly because they form the connecting link between *Steno's* works on anatomy and physiology on one side and his works on geology on the other.

Various Minor Anatomical and Physiological Observations.

The first fishes, of which *Steno* gave a description, were two rays. Having mentioned the system of the mucous canals, also a discovery of his, he went on to describe the position of the viscera, the glands of the stomach and the intestines, and the spiral lamina of the latter, which he also was the first to describe, fully realizing its importance to the digestion, in that it makes up for the greater length of the intestines in other animals. As has already been mentioned, he also touched upon the question of the egg-shells of the rays. Furthermore he described the structure of the branchiæ, pointing out that the latter were constructed in such a manner that the water could only pass one way, the result being a constant supply of fresh water to the fish. He was of the opinion that the fishes were breathing in this manner, but said that the term *respiratio* might not be the correct one, when the matter in question was water; according to his belief the water in itself played the same part in the respiration of the fishes, as did the air in the respiration of the animals provided with lungs. It must be borne in mind that *Steno* wrote before *Boyle* and a hundred years before the discovery of the oxygen. After having meditated on the connection between the process of respiration in fishes and their lack of voice he proceeded to describe the operculum pupillare, by which

Rays and Sharks.

he was led into a discussion of the morphology of fishes and mammals.

A few years after his description of the anatomy of the ray *Steno* published an account of some discoveries, which he had made while dissecting the head of a big shark. Again he first dwelt on the system of the mucous canals; then he described the lateral line system of canals, which he had discovered in the eel and refound in all the fishes he had afterwards examined; but as to the purpose of these canals he declared himself to be ignorant. He next mentioned the organs of secretion in the skin of the fish and the structure of the skin in general, and here his generalizations, for once, carried him beyond the actual facts. The structure of the eye was also touched upon by *Steno*, and he was the first to correctly describe the stem which in the *plagiostomes* fixes the eye-ball in the orbit, as well as the optic nerve which earlier zoographers had failed to detect. At the same time he demonstrated the existence of a *chiasma*, which is lacking in other fishes, and called attention to various facts concerning the central nervous system, among others, as has already been mentioned, to the small size of the brain. In connection with this Treatise *Steno* published a brief description of another smaller shark (see above). He first mentioned, how through this dissection he found the proofs of the correctness of some of his earlier observations; he described the olfactory organ, where his attention had especially been attracted by the existence of numerous folds of the skin, which he rightly regarded as being of the same importance to the function as the folded and spongy structure of the osseous tissue of the higher vertebrates. In the same place *Steno* furthermore maintained that the *testes* of the female mammals correspond to the ovaries of the oviparous animals; but this has already been mentioned in a previous section.

One part of *Steno's* description of the head of a big shark is, however, well worth dwelling upon, *viz.* the one which deals with the shark's teeth. *Steno* gave figures of the shark's head with its mouth open, as well as of single teeth, the figures being borrowed from the MS. of *Mercati's* as yet unpublished work *Metallotitheca Vaticana*; he described, how the several rows of teeth differed in consistence, and admitted that he was unable to understand the use of those teeth, which are quite soft and lie beneath the mucous membrane. But as early as in the following Treatise he set forth as his supposition that these soft teeth were meant to succeed the hard teeth, according as the latter were falling out, and in his work *De Solido Intra Solidum* &c. he finally arrived at a clear conception of their importance. He also made comparisons between sharks' teeth and the bodies, which at his time were called *glossopetræ*. As to the formation of the latter the then current views were very much at variance; but the

theories, which were most generally accepted, tended towards the explanation that, like so many other bodies which were found in the earth and exactly resembled parts of animals or plants, they had been formed in the earth, at the place where they were found, either by a force inherent in the earth (*vis plastica*), by a *lusus Naturæ*, or by the Creator himself; and as to the immanent forces of these bodies the current opinions were alike unscientific. Contrary to most of the naturalists of those days *Fabio Colonna* had declared *glossopetræ* to be simply sharks' teeth in a fossil state. This also was *Steno's* opinion, and perceiving how close was the resemblance between sharks' teeth and the *glossopetræ*, and furthermore taking into account the nature of the soil in those parts where *glossopetræ* were found, he was, through the following considerations, led to nothing less than the foundation of scientific geology; for he rightly perceived that what was true in the case of sharks' teeth, was necessarily also true in the case of all other parts of animals or plants found in the earth, and the six *conjecturæ* he laid down consequently comprised all such bodies: 1. *Terra, unde animalium partibus similia corpora eruuntur, corpora illa hodie non producere videtur.* 2. *Eadem terra non videtur fuisse compacta, cum prædicta corpora ibi producta sunt.* 3. *Nec forte repugnat, qvo minus eandem terram aqvæ olim tectam fuisse credamus.* 4. *Nihil qvoque obstare videtur qvo minus credamus, eandem terram aqvæ olim fuisse immixtam.* 5. *Nec quicquam obstare video, qvo minus eandem terram pro aqvæ sedimento sensim congesto habeamus.* 6. *Nihil obstare videtur, qvo minus animalium partibus similia corpora, qvæ e terris eruuntur, pro animalium partibus habeantur.* *Steno* gave good reasons for these conjectures; but as to his proofs reference must be made to the work itself. One point, however, is still to be mentioned, that in his list of contents *Steno* says that in earth from Malta are found vertebræ of fishes, closely resembling a vertebra still sticking in the clay, which *Fr. Maria Fiorentini* had shown to him, a circumstance which certainly strengthened his opinion concerning the nature of the *glossopetræ*. Finally *Steno* touched upon the question of the way in which mineral substances come to fill up the spaces formerly occupied by organic bodies, having cast themselves entirely in the mould of the latter.

As mentioned above the large, geological work, which *Steno* intended to write, was never accomplished, and only a *Prodromus* is extant. Because of the brief and condensed form of this work, so abounding with new ideas, it is impossible to give an account of it in a still more condensed form. Here again the reader must be referred to the book itself, though a few remarks on the state of geology at the time of *Steno* might perhaps be appropriate in this connection. It was universally taken for granted that the Earth had come into existence only a few thousand years ago, created in the way which has

been recorded in the *Genesis*. It was further presumed that the surface of the Earth, together with its animal and vegetable life, had undergone no essential changes, apart from those which had been occasioned by the Deluge and the inundations and volcanic eruptions mentioned by the historical writers. As to the difference between the various strata of the Earth the knowledge of those days was very imperfect, and as to the origin of the several strata it was practically nil. The fossils occurring at certain places were, as has just been mentioned, looked upon as having been formed on the spot by means of an instantaneous force, or produced by the Creator himself. Whichever the view taken, there was no difficulty in accounting for the occurrence of bodies, which e. g. resembled sharks' teeth or other parts of animals living in the sea, at places far from the sea, nay, even on mountains. If, on the contrary, these bodies were looked upon from the point of view of having really once belonged to animals, which had their home in the sea, there arose the apparently invincible difficulty of explaining how they could have reached these places far from the sea, where they are found, often in great numbers.

The contents of *Steno's* work will, as has been mentioned above, not be reported in this place; only its main lines will be set forth, and these as briefly as possible. After a thorough observation of the bodies exactly resembling animals or parts of animals which are to be found in the earth, and after a minute examination of the qualities of the soil, in which they are found, *Steno* arrived at the absolutely unquestionable result that these bodies are remains of animals, and that these very bodies, if in every respect resembling animals living in the sea, must be the remains of such marine animals, and, finally, that they, together with the earth in which they are imbedded, must be sedimentary deposits. *Steno* finds that while certain strata of the Earth contain such bodies — fossils — there are others which never contain them, and the latter he rightly looked upon as the oldest, those which have formed the original Earth, on the surface of which the fossiliferous layers have been deposited as sediments of the sea. He further shows that each of the fossiliferous layers originally had an upper and a lower horizontal and level boundary plane, naturally produced by the way in which it has been formed. An exception from this rule is only the oldest and deepest fossiliferous layer, the upper surface of which, it is true, is horizontal and level, while the lower one has the form which corresponds with the surface of the non-fossiliferous layer beneath it. *Steno* furthermore points out that at those rather numerous places, where the fossiliferous layers are limited by planes, which are not horizontal, the limiting planes are still level and parallel to one another, for which reason their situation, deviating as it is from the original horizontality, must be looked upon as secondary, either

produced by the collapsing of deeper layers — e. g. through the influence of water and fire — beneath the upper layers, which then have shared in the collapse; or by the raising of deeper layers — e. g. by volcanic eruptions — which at the same time have raised the layers above them. Thus he also accounts for the occurrence of layers containing marine animals far above the present surface of the sea. — As the basis of his theory *Steno* had only the observations, which he had had the opportunity of making in Tuscany when travelling about the country in the company of the Grand-Duke, and although Tuscany is especially favourable for observations of this sort, we can not but admire him for having found the time to make such a number of excellent observations as he did, but also more especially for the way in which, from out of his knowledge of such a very small part of the entire surface of the Earth, he was able to make generalizations applicable to the whole of the globe. *Steno's* explanation of the formation and the occurrence of the fossils, as well as of the nature and position of the various strata, is the one still in force in our own days; for after having fallen into oblivion for more than a century its position was established in the beginning of the nineteenth century, especially through *Elie de Beaumont*, who translated great parts of *Steno's* book, thus showing how far he had reached, even at such an early date. There are two points, however, in the history of the formation of the Earth, in which *Steno's* knowledge is decidedly behind that of our time. Firstly, with regard to the changes which in the process of time have taken place in the surface of the Earth, where — for external as well as for internal reasons — he had to keep within that limited space of some few thousand years, which according to the doctrine of the Church had elapsed since the creation of the world, for which reason he had to prove, what appears to have given him some trouble, that all the changes in the surface of the Earth can have taken place during that short space of time. Secondly, he had to let all changes be occasioned by violent revolutions in nature, partly to bring them within such a limited space of time, partly because, with the knowledge of those days, he could have no idea of the changes slowly and daily taking place in the surface of the Earth, and of the immense effects of these changes through exceedingly long periods.

Steno's examination of bodies found in the earth was, as the very title of his book suggests, not limited to the remains of animal and vegetable life, that is fossils, but comprised all solid bodies, which in nature occur inclosed within other solid bodies, and thus he was also led to the study of crystals. Even scientists who had especially devoted their time to the investigation of crystals and their occurrence, as for instance *Steno's* friend *Montanari*, were of opinion that crystals still were being formed in the cavities of rocks, having a vegetative growth, and

drawing nourishment on that side where they stick to their matrix; it was likewise a current belief that if crystals were removed from the spot, where they were fixed, others would form themselves at the same spot. The explanation which *Steno* offered of the formation of the crystals was quite different from the latter theory; being based upon ingenious observations and conclusions it is once more the explanation, which holds good to this very day. *Steno* admitted that he was quite unable to determine the manner of the first delineation of crystals, but he maintained that crystals only increase in size in fluids and that the growth, when once begun, will continue through the medium of new crystalline matter, *materia crystallina*, being put to the planes of already delineated crystals. *Steno*, however, did not rest satisfied with this. After a thorough examination of different crystals — crystals of quartz, iron ore, pyrites and others — he showed that every crystallizable substance crystallizes in its own particular form, of which crystal forms he gave very exact descriptions with illustrations, being likewise the first to mention that the opposite planes of crystals are always parallel to one another. *Steno* also made numerous other valuable remarks and observations concerning crystals, which it would take too long to enumerate in this place.

Not only did *Steno's* principal work on geology never appear; but even of smaller writings on geological subjects only two short Letters to *Cosimo III* are extant, containing descriptions of the grottos at Gresta and Moncodine, which were, in fact, not published till long after *Steno's* death. They are interesting, in that *Steno* here points out that rock-crystal can not be indurated ice, at that time a not uncommon belief; but they are also remarkable because of the natural explanation which *Steno* gives of the fact that the temperature inside a grotto is so much lower than the temperature outside in summer time and *vice versa* in winter time, thus rendering the doctrine of the *antiperistasis* superfluous.

Steno's work in the service of science did not end abruptly; yet within a few years it rapidly diminished in quantity as well as in merit, until at last it ceased altogether, when he was only thirty-five years of age.





THE present *Edition* of Steno comprises all the works of a scientific nature, which are known to exist from his hands. It embraces not only the scientific works, which he himself published (II. IV. V. VI. XIII. XV. XVI. XVII. XXII. XXIII. XXIV. XXVII) and those which he left to others to publish (X. XII. XIX. XX. XXI. XXV. XXVI. XXVIII. XXXI. XXXII. XXXIII), but also those which appeared without his knowledge, such as the *Letters* to Thomas Bartholin and Cosimo III and his *Lecture* on the anatomy of the brain (I. III. VII. VIII. IX. XI. XIV. XVIII. XXIX. XXX). An *Appendix* has been added, comprising two fragments of *Letters* (XXXIV. XXXV) dealing with observations made by Steno, as well as the notes which his pupil, Holger Jacobæus, wrote on the dissections and lectures of Steno during the years of 1672—1674 (XXXVI).

In the present *Edition* the works of Steno are printed in the order in which the researches, forming the basis of the various *Treatises*, were made. This is, according to the view of the editor, all the more justifiable, as in that manner it becomes possible to follow with ease the course of Steno's researches, while if the *Treatises* were arranged after their dates of publication, works, which were very near to one another in subject and the dates of the researches they record, would have to be placed far apart. An arrangement of the *Treatises* after their contents would be quite impossible to carry through, seeing that so many of the *Treatises* each of them deal with such widely different subjects.

Below the half-title of each *Treatise* have been placed the arms of the town where the researches, which are mentioned in the *Treatise*, wholly or for the greater part were made, or where the *Treatise* was composed.

The figures on the title-pages represent the *Theatrum Anatomicum* of Copenhagen at Steno's time. They are reproduced from Thomæ Bartholini *Cista Medica Hafniensis*. Hafniæ 1662.

In cases where the Treatise has been edited more than once, the editor has made use of the text of the original edition. Differences between the text of the original and that of the later editions have been mentioned in the notes, except in cases where they are of no interest whatsoever. Only in Treatise II the text of the second, considerably enlarged, edition has been preferred, which edition appeared as early as one year after the publication of the first edition and was undertaken by Steno himself. Here, too, the notes call attention to all variations of interest between the two editions.

By far the greater part of Steno's works are written in Latin. In all of these a uniform orthography has been carried through, corresponding as nearly as possible to the orthography of the first works of Steno, published in Holland in 1661-62, with the one exception, however, that the extensive, but inconsequent use of accents has been abandoned. Unquestionable misprints have simply been corrected, while in cases, where there is any uncertainty whatsoever as to the justice of the corrections made, the original reading has been given in the notes. This also applies to the Treatises which are written in French, Italian and English, but in the latter only mere misprints have been corrected, the orthography being otherwise exactly reproduced. In quotations from other writers Steno makes use of his own orthography; where there is any important difference between the quotations, as found in Steno, and the same passage in the writer quoted, these differences have been mentioned in the notes, whenever the works in question have been within the reach of the editor.

In the extracts from the MS. of Jacobæus the same orthography has been carried through as in the text of Steno.

Here as well as everywhere in the text of Steno the abbreviations have been expanded, partly to make the understanding easier, partly for typographical reasons.

The figures have been executed from photographs after the figures of the original editions, except a few of the figures in Treatise XXII, which unhappily have been reproduced by tracing the figures. The great plate in vol. II facing p. 238 and the figures in the MS. of Jacobæus have been executed from photographs of the original drawings. With a very few exceptions, of which account has been rendered in the notes, they have all been reproduced in the size of the original.

The object of the notes is:

1. To give concise information as to the facts mentioned by Steno, in cases where these facts cannot be supposed to be immediately intelligible to readers with an ordinary scientific training.

2. To give an account of the different, more important readings in the various editions of Steno's works.

3. To give the correct and complete titles of the works, to which reference has been made by Steno, as well as to show where in these works the quotation or the passage referred to by Steno is to be found.

4. To give short biographical data about the persons mentioned by Steno. In the case of the Danes these data have been made a little more complete, as the foreign reader will have greater difficulty in procuring satisfactory information about them. Reference has generally been made to biographical dictionaries, such as must be supposed to exist in every larger library, only in a few cases to monographs on the persons in question.

On the other hand no attempt has been made to give, in the notes, longer historical explanations of the relation of science to the various scientific questions, which have been treated in Steno's works, seeing that this would carry us much too far and naturally belongs somewhere else.

The quotations in the notes have been printed with the orthography of the work, from which they have been taken, so also the titles of books. Exceptions are such quotations and titles, as the editor only knows at second hand. For typographical reasons it has also been impossible to render several of the abbreviations.

The most important biographies of Steno are:

Domenico Maria Manni, *Vita Del Letteratissimo Monsig. Niccolò Stenone Di Danimarca Vescovo Di Titopoli E Vicario Apostolico*. Firenze 1775.

Angelus Fabronius, *Vitae Italorum Doctrina Excellentium, Qui Saeculis XVII. Et XVIII. Floruerunt*. Pisis 1778—1805. vol. III. 1779.

J. Wichfeld, *Erindringer Om Den Danske Videnskabsmand Niels Stensen — Nicolaus Steno*. Historisk Tidsskrift, 3 Række, 4 Bind. Kjøbenhavn 1865.

C. C. A. Gosch, *Udsigt Over Danmarks Zoologiske Literatur*, 2 Afdeeling, 1 Hefte. Kjøbenhavn 1872.

Wilhelm Plenkens S. J., *Der Däne Niels Stensen*. Freiburg im Breisgau 1884.

A. D. Jørgensen, *Nils Stensen*. København 1884.

I REGRET that it will be quite impossible to me to enumerate each one of the many, who have kindly placed their time and knowledge at my disposal, whenever I asked them for help. I must here content myself by begging them, one and all, to accept my best thanks.

There are, however, three men, to whom I am under special obligations for their valuable and indefatigable assistance: *V. KUHR*, M. A. for his competent and careful assistance as regards the philological part of the work; *CARL S. PETERSEN*, Librarian at the Royal Library of Copenhagen, for the never failing kindness with which he has let me profit by his extensive knowledge, and *R. H. STAMM*, M. S., Lecturer at the University of Copenhagen, for much valuable information, especially as regards zoological matters, for all of which I beg these three men to accept my most heartfelt thanks.

VILHELM MAAR



DE PRIMA
DUCTUS SALIVALIS EXTERIORIS
INVENTIONE & BILSIANIS
EXPERIMENTIS





THOMÆ BARTHOLINO

HAFNIAM



UM tuum in me affectum confidero, Celeberrime Vir, meque nihil tale promeritum intueor, non possum, quin summam tuam humanitatem ea, qua par est, veneratione prosequar: Tot enim tui amoris se manifestant argumenta, ut vel hinc mihi pateat, Vesteres optimo jure

Præceptores sancti voluisse Parentis

— — — *Esse loco,*

diemque, quo in discipulorum numerum a te adoptatus sum, natali merito censeam comparandum. Quid enim aliud sibi vindicant humanissimæ tuæ litteræ, digna cujus omnibus cum magna gratiarum actione responderem membris, nisi singula tanta essent, ut peculiarem sibi responsionem flagitarent? Quod cum mea infantia non permittat, satius duco grata hæc mente recondere, quam, verbis prolesario more gratias agendo, leviora quam pro rei dignitate proferre.

Cum vero, ut ductus salivalis exterioris iconem edam, in eadem epistola author mihi sis, non possum, quin & invidiam, quam hæc mihi inventiuncula peperit, & simul, quem ex hac invidia percepi fructum, paucis tibi exponam, non ut in mustaceo laureolam quæram, sed ut invidiosum plagii crimen a me rejiciam. Doleo namque, eam mihi imponi necessitatem, ut vel de re non ita magni ponderis multa fari, vel turpem ignominia notam subire cogar. Res quidem ipsa rite ponderata id nequaquam meretur, maxime cum similis omnino ductus jam ante fuerit inventus, quin ipse, de quo in præfens agitur, a *Casserio*, licet musculi nomine (quod ex tuis in

buccinatoris musculi historia didici *Institutionibus*) observatus: Cum tamen, quod ejus gratia mihi intentatur, crimen silentium minime patiat, tibi, ut Præceptori discipulus, totam rem enarrabo, tuoque iudicio, quid inde decernendum, relinqvam. Sæpius jam a Clarissimo *Sylvio* & a Celeberr. Dno. *van Horne* secundo exhibitus publico ductus ille fuerat, cum aliquot inde hebdomadibus, quam ob causam nescio, abalienatus a me Clariss. *Gerard. Blasius* tantum suis tribueret affectibus, ut, licet ductus istius inquisitioni manum nunquam admoverit; licet, cum semitruncatum illi primo exhiberem, quid esset, non valuerit significare; licet in suis ad *Eyffonium* litteris Frater ejus paucis, antequam hæc mihi significarentur, diebus inventionem illius mihi tribuerit; licet ipse tandem in ultimo de *Medicina Generali* scripto, rei, quam se reperisse ait, nec verum assignet ortum, nec exitum verum: nihilo minus Clariss. *Viris Sylvio* & *van Horne* per Fratrem, hinc prædicto in libro omnibus sibi illam deberi, significaret. Quæ ut manifestiora evadant, veniam dabis, si & inventionis occasionem, & quid inde actum, paucis exposuero.

Annus est, cum ego, a *Blasio* hospitio exceptus, observans in illo, cui tertia ab adventu meo hebdomade finem imponebat, collegio commodam subjecta Anatomica habendi occasionem, sollicitarem Clariss. Virum, liceret, quæ mihi comparaturus essem, propria manu dissectare. Quod cum impetrassem, faventem adeo sensi fortunam, ut in primo, quod 7. April. mihi emptum in Museolo solus secabam, ovillo capite ductum, a nemine, quod sciam, descriptum, invenirem. Detractis quippe communibus velamentis sectionem cerebri meditabar, cum forte vagantia per ora vasa prius examinanda iudico. Eo itaque fine venarum arteriarumque vias immisso stylo explorans, apicem observo non ulterius intra tunicarum angustias coactum ampla in cavitate liberius vagari, moxque ferrum protrudens ipsos sonare dentes audio. Miratus rei novitatem Hospitem voco, sententiam ejus auditurus, qui primo vim acculare, mox ad ludentem sæpius Naturam confugere, tandemque *Whartonum* ad patres vocare. Sed cum nec ibi quicquam offenderet, nec tractata negligentius vasa longiorem inquisitionem admitterent: majori cum attentione hæc alia vice examinare decrevi, quod & paucis inde diebus in canino capite, licet obscurius, successit. Cum itaque usum vasis argueret magna cum inferiori affinitas, eodem mense Præstantissimo Dn. *Jacobo Henrico Paulli*, amico conjunctissimo, me vasculum ali-

quod salivale invenisse, significavi, adjuncta aliquali ejusdem descriptione. Sed quandoquidem simile quid jam tum inventum scirem, nec, an aliis idem fuerit observatum, divinare possem, filui, donec data occasione Clarissimum Syhviu[m] ea de re consulere liceret: Qui his auditis in homine quærendum illum judicavit, inventumque Spectatoribus aliquoties demonstravit.

Habes hic, Clarissime Vir, inventionis historiam: Sed ut certior ea de re sis, en argumenta ab ipsis mihi accusatoribus subministrata. Junior Blasius, J. D. & Advocatus, qui ad Majum usque mensem eodem anno Amstelodami degebat, qui ædes nostras quotidie adibat, qui sectionibus, quas a Fratre ejus administratas vidi, omnibus intererat: hic, cum illius vasis mentionem publice factam a Domino van Horne audivisset, misit eo nomine ad Eyffonium, Professorem Groningensem Celeberrimum, litteras inventionem ejus mihi tribuendo. Qvis credet itaque, Fratrem cum Fratre, dum Amstelodami viveret, quotidie loquentem, novitatis, si quis unquam, avissimum, rerum Anatomicarum peritum, a Fratre reperta ipsi non adscripturum? Unum ab ipsis suppeditatum mihi telum vidisti; liceret etiam plura proferre, si operæ pretium videretur: Sed quamvis in privatis litteris Blasius non rationibus se tuendo, sed convitiis, meque mendacem, iniquum, malevolum, invidiæ fermento inflatum, & nescio quid non, appellando meritis sit, ut non modo, quæ pro me facerent, omnia proferrem, sed &, quibus me oneravit, in ipsum rejicerem; cum tamen, quæ in me conjecit, nunquam probaturum sciam, quæ in illum retorqvenda, plerisque adeo nota sint, ut meo non indigeant præconio; si in tam nobili loco, in tanta omnis generis eruditorum corona & quidem iterato nomen meum ductui isti a Clariss. Domino van Horne non fuisset additum; de jure meo lubens cessissem. Jam vero ne in conscientiam trahatur modestia, de illata mihi injuria vel invitatus conquæri cogor. Ut vero ad alla tandem deveniam, unum adhuc, quod validissimum judico, addam. Ipse Blasius in eo, quem de *Medicina Generali* scripsit, tractatu, se nunquam in ductum illum inquisivisse, manifesto indicio prodit; nec enim veram illi originem, nec egressum verum tribuit, quin ipsi, unde scaturigines habet, glandulæ usum adeo ignobilem adscribit, ut nisi me illum ei exhibuisse certus essem, nunquam illi visum affirmarem. Patebit hoc magis in illa, quam sub manibus habeo, disputatione. Quandoquidem enim parotidum affectus & alii vicinarum partium

morbi, qui ex hisce aliisque a me observatis lucem aliquam accipere videntur, accuratius examen requirant; non abs re fore credidi, si interea exercitii gratia de glandulis quibusdam capitis cum earundem, ut in vitulino reperiuntur, vasis disputationem adornarem. Hoc enim parum æquæ illius accusationi debeo, quod, cum vitulinum caput, in quo se vasculum hoc reperisse ait, ad descriptionis illius normam examinarem, non modo ne umbram quidem illius in vitulo visam illi manifeste observarem, sed & nova quædam lymphatica notarem. Parotidum namque examen & cum maxillarium, inferiori collatio in trium glandularum natura quidem a prioribus diffidentium, per vasa autem commercia cum iisdem exercentium, inquisitionem deduxit: e quibus salivales glandulæ duas, interior unam, alteram exterior, sibi associarunt, tertia in collo sita, superiore sui parte, quæ gibba est, a duabus illis vasa accipiens, novum ab inferiori & concava parte satis conspicuum canalem deorsum mittit, quem resectum a trunco caput ulterius prosequi vetabat. Sed de his in dicta disputatione uberius, modo & clarius interea licuerit in alio eadem notare, cum alio ductu, quem in thorace vidi a thoracico & situ & contenti colore discrepantem, de quo nihil observavi præter ductum satis longum in sinistro thoracis latere ultra noni nervorum paris internam ramum situm, adque glandulas jugulares ascendentem, quem, si a fonte ad ostium usque accuratius prosequi dabitur, una cum cæteris tibi, ut qui primus hæc vasa detexisti, & cui, quos inde rivulos alii addidere, omnes debentur, in grati animi signum, cum aliter gratum me ostendere non liceat, offeram.

Cum autem vasis illius meminerim, afferam experimentum, quod prædicta in alio cane frustra quærenti se præter opinionem exhibens a *Bilfii* partibus prima fronte magis esse apparuit, quam vera fuit. Dum enim pastum nuper canem a coena illico aperio, primo statim adspectu egregium præsentibus spectaculum exhibuere albis lacteorum gyris undique picta intestina, ut sanguini ad illa delato recurrens inde lac copia cedere vix putarem. Sed quia receptaculum nondum lacte tinctum, & thoracicus valde exilis, vinctulo huic injecto in crastinum canem repono. Sequenti die, quæsitus frustra cæteris, ad cisternam rediens omnia mutata reperio; ipsa enim pridie arcta, & nihil minus quam lac referens, albo humore jam distenta tumebat. Thoracicus etiam, vix tum conspicuus, simili modo turgens plurimos ostendebat ramulos post brevem digressum in eun-

dem, unde orti, truncum redeuntes, quod vero huc præcipue facit, a receptaculo ad glandulam inguinalem usque productum vas totum lacte plenum conspicietur, licet quidam e rivulis ad idem vas aliunde tendentibus lympham colore aqueo proderent. Mirabar initio, quia ratione in glandulam derivatum lac valvularum repagulo non fuerit retentum, sed mox concidentibus interdum in mortuo valvulas resistendo non esse facile videbam, maxime si compresso fessum vase lateri, quod a Clariss. Sylvio audiui, applicentur. Nec dubito, quin hæc *Bilsum* fallant, qui, ut succum exprimant, vasa compressit, unde admotæ lateribus valvulæ commeanti ultro citroque liquoris facilem transitum condunt. Cætera istius viri mysteria quod attinet, minoris sensum fieri videntur, cum & Balsamo condita a Celeberr. Dn. van Horne manus mumiis illius palmam dubiam faciat, & sectio sine sanguine non adeo difficulter posset administrari. Cum enim, ligaturis se uti, nobis retulerit, facile apparet, quia ratione ex una parte corporis in alteram derivari possit sanguis vivente adhuc animali. Ligato quippe in vicinia cordis aortæ trunco descendente cum ascendente cava, non dubito, quin cor omnem ex inferiori corporis regione sanguinem exhauriens superiorem sit repleturum, eoque modo facile foret vacuatas sanguine partes pro lubitu fessare, & vicissim, quæ visum alias fugiunt, vasa humore turgentia oculis subicere videnda. Tentassem hæc, si in vivorum sectione magis fuisset versatus, nec angusta domi res ab illis me experimentis, quæ & sumptus requirunt & tempus, retraxissent. Magnam nihilominus spem injecere mihi novissimæ tuæ litteræ, quibus & ad studia hæc me animare voluisti, teque mei memorem data occasione futurum asseverare. Mæcenates namque illi non defuturos scio, cui suam ea in re operam tantus vir pollicetur. Sed nimium te detineo. Vale, Clarissime Vir, meque tuo favore dignari perge.

Dab. Lugd. Batav. Ao. 1661. 22. Ap.

T.

Obsequ.

NICOLAUS STENONIS



DE GLANDULIS ORIS & NOVIS
INDE PRODEUNTIBUS
SALIVÆ VASIS





DE GLANVILLE ORIS & NOVIS
INDE PRODUCTIBUS
ALICE MARS



PERILLUSTRI & GENEROSISSIMO HEROI,

D. OTHONI KRAGIO,

Dno. de Wolberrig, Senatori Regio Amplissimo, & ad Celfiff.
Belgii Foederati Ordines Exlegato Gravissimo, arcis
& territorii Neoburgensis in Fionia
Gubernatori,

ADMODUM VENERABILI & VIGILANTISSIMO PATRI,

D. D. JOHANNI JOH. SVANINGIO,

Daniæ & Norwegiæ Archiepiscopo Confummatissimo,
in Collegio Status Affessori & Collegii
Confistorialis Præsidi,

CLARISSIMO & EXPERIENTISSIMO VIRO,

D. D. THOMÆ BARTHOLINO,

Ser. Reg. Maj. Dan. & Norw. in Acad. Hafniensi Professori
Honorario Celeberrimo, & Facult. Med.
Decano,

Mæcenatibus, Promotoribus, Præceptoribus
obsequio æternum devinctus

Humiliter & officiose

NICOLAUS STENONIS

D. D. D.

INTER alia, quæ causæ ignoratio mirandis accenset, summam meretur admirationem illa menti humanæ divinitus concessa vis, quæ recepta per sensus rerum simulachra, quandocunque placuerit, sibi repræsentat, & res absentes quasi præsentem, omnesque, quas in ipsis ante observavit, partes in imagine intuetur eadem figura, magnitudine, colore, situ, melius longe ac si a Protogene, cujus etiam rudimenta cum naturæ veritate certabant, ad vivum fuissent delineatæ. Adeamus enim, qui rerum naturalium rationes scrutandi avidus inter experimenta ætatem consumpsit, senem, sed viridi senecta gaudentem, eumque intra tam parvæ capacitatis sphaeram, cranium intra, immensum & per spatia fere infinita extensum universum universique membra animo percurrere mirabimur. Hic ad astra evolans constantem fixorum ordinem, fallere nescios planetarum errores, omni lege carentes cometarum excursus nobis evolvit; inde momento relapsus aërem pervagabitur, & jucundas colorum varietates, stupendas ignium formas in illis regionibus se per intervalla ostendentes depinget; hinc in terram descendens, varia, quæ se ibi offerunt, accuratissime elaborata Naturæ opera, & illis vix cedentia artis imitamina exponet: tandem in terræ viscera penetrabit, & abdita mineralium mysteria revelabit. Has ille ideas omnes nutui suo habet obsequentes, ac si macrocosmus microcosmo lateret inclusus. Sed ut illa facilis adeo receptarum imaginum omnium consideratio miraculo plena est; ita singularum receptio, si rem integre repræsentabunt, magno cum labore & difficultate conjuncta, & vix unquam ab ullo speranda. Mens enim in varietate delectationem quærens adeo in potentia sua impotens est; ut, dum in rerum examine versatur, tò hoc age sibi non possit imperare, nec ab aliis cogitationibus adeo vacuum se reddere, ut uni soli vacet constanter: partium autem, e quibus naturalia corpora com-

ponuntur, juncta multitudini subtilitas tanta est, ut vel maxime attentum fallat & eludat. Quid miramur itaque, licet ab omni ævo multi summo labore & studio indefesso id egerint, ut animalium fabricæ ideam omnibus numeris redderent absolutam, eandem nihilominus etiamnum mutillam deprehendi & imperfectam? Qvod si enim, qui exteriora duntaxat integri animalis lineamenta penicillo imitantur, nunquam circumspecte adeo omnia observant, quin ejusdem artis peritior accedens alius alia inveniat delenda, supplenda alia, alia mutanda, quid ab illis, qui præter exteriorum partium inter se proportionem etiam interiorum omnium imagines cerebro inscribere nituntur, majorem expectamus perfectionem? Artificiosa singularum textura, Dædalea juncturarum coagmentatio tot involvuntur admirandis, tam uberem quærendorum segetem ostendunt, ut, licet multorum in unum conspiret labor, licet longa annorum series accedat, vix tamen certam earum cognitionem expectare liceat. Sunt, fa-teor, qui ad illam, de qua loquimur, ideam perficiendam faciliorem patere viam sibi persuadent, nec opus, ut externis omnia sensibus subjiciantur, posse solam rationem, quæ desiderantur, cætera supplere. Sed eodem & ego jure existimarem, ut heroicam Alexandri Magni gravitatem mutæ Apelles imagini daret, suffecisse tumultuariam spirantis faciei inspectionem, potuisse eum, quæ eadem velocitate assequi non valuit, ex ingenio sufficere. Vereor autem, ne illorum censuram mererer, qui dicerent, heroicam quidem majestatem eo modo exprimi, non autem majestatem Alexandri. Sic & præsentī in negotio, quamvis ingenii in novas ex ante observatarum conjunctione & separatione figuras gignendo magna vis sit, quamvis nihil illi facilius, quam varias ejusdem rei causas comminisci, ubi tamen res ipsa filet, quicquid illud loquitur, posse quidem id ita esse, firmissimis demonstrat argumentis, esse autem, asseverare non sustinet. Id quod latius diducerem, nisi vestra, Magni Viri, in re mentis vires spectante cognitio, quantum humana fors patitur, perfecta ruborem mihi incuteret, ne dicam, silentium imperaret. Vos enim, & Veterum monumentis eruditi, & longo rerum usu docti, in ipsa hujus Dæ adyta penetraſtis, adeoque, quid ad conceptus quam integerrimos formandos requiratur, penitus pervidetis. Suffecerit itaque unum item & alterum duntaxat exemplum attulisse, ex lymphaticorum historia peti-tum. Quis per tot secula, etiam ab ingenio paratissimus, vel per somnium de lymphaticis cogitavit, antequam tuis ea, Clariss. Bartholine, non mentis, sed corporis observata oculis, omnium oculis exponeres? Sed ab illo tempore, quis solo ingenio, quæ etiamnum latent, valuit revelare?

Quis in hepate vel in reliquo corpore, unde lymphaticorum extrema oriantur, certo argumento demonstrare? Eandem observationum necessitatem salivæ origo comprobat: quam in os deponentes vias sensuum ope destituta ratio nullas invenit; nec, quæ materiam ejus glandulis advehunt, quantum ego quidem mente assequi valeo, certæ unquam nobis erunt, si a solo ingenio expectandæ. Rationi accedat, oportet, observatio, & secundum omnes, quantum licet, partes res ipsa examinetur, ut rem vere exhibens menti inscribatur figura. Quod dum pro virili quisque hoc seculo agit, suasque eo fine examinandas proponit observationes, non potui, quin & ego, quæ ad lymphaticorum non modo revehentium usum, satis alias confirmatum, illustrandum, sed & eventuum numerum augendum conferre observavi, publico proponerem, & magnis, quos alii congefserunt, acervis parvulum adderem manipulum. Ne autem sine patronis hic esset libellus, vobis, magna Patriæ lumina, & vestro eum nomini inscripsi, cum illud naturale divini ingenii vestri lumen svaderet, multiplici usu acquisita sagacitas flagitaret, magna partim in me, partim in meos promerita juberent. Sereno itaque vultu hæc qualiacunque fortunæ laborum meorum initiis benignius adspirantis munera excipite, & qui felicem per plurima lustra vitæ decursum, & nunquam morituram nominis gloriam vobis opto & voveo, ulteriori favoris vestri aura foveo.

Lugd. Batav. Anno 1661.



§ 1.

QUISQVIS cum convicto a *Socrate Aristodemo* admiserit, quod omnes sana ratione utentes admittere tenentur, animalium fabricam σοφοῦ τινος δημιουργοῦ, καὶ φιλοζώου τέχνημα esse, non inficiabitur, cum omnia illorum membra partesque in membris contentæ omnes προνοητικῶς se factas ipsæ pæne loquantur, cum tam minutum nihil videatur, quod suo non destinatum sit usui, nihil tam abjectum, quod Conditoris sapientiam non doceat, demonstret, ut dexteritatem *Apellis* olim simplicissima artisque ignaro ridenda linea. Si enim qui & mentis & motus expertia simulachra fingunt, ne quid deficiat, ne abundet aliquid, ut omnia, etiam minima, quam accuratissime elaborata subjiciantur oculis, studiose conantur; si architectus vitio sibi ducit in exstructo a se ædificio vel tantillum spatii otiosum, nec certo scopo deserviens, relinquere: quis crederet ab illo, quem consummatissimi quique artifices ad imitandum sibi, licet impari successu, proponunt, inanem ulla in parte locatam operam, & frustra quicquam productum? Qvis non potius, etiam in minimis maximum, imo admirandum latere artificium, judicabit?

§ 2. Proinde dolendum, fuisse inter magni nominis viros, qui non pauca tantum σημείου χάριν in animalibus facta dicere sustinuerint, cum menti consilioque divino nihil magis repugnet. Dolendum magis, esse, qui de quibusdam summi terrarum Architecti operibus abjecte adeo sentiunt, ut, quod exilia videantur, quod magnum primo intuitu apparatus non ostendent, quorum inquisitioni tempus impendatur, indigna judicent, imo verbis ipsa, pæne contumeliosis, resiciant. Humanæ quidem infirmitatis est, quod, qui sensibus non utentes, sed abutentes, non nisi jucunda & splendida sectantur, ἐν πορφύρῃ πύθχον venerantes, *Silenos Alcibiadis* transeant, di-

ligentissimi Naturæ scrutatores futuri, si Epicuream in omnibus (ut Cicero loqui amat) Pronœa se nostra exhibuisset. Qvòd vero neglexisse, parum illis videatur, nisi etiam censoria adhibeatur virgula in iis, quæ nulla ratione percipiuntur, non infirmitatis amplius, sed malitiæ est argumentum. Prudentior olim lingua magni illius Sapientis, qvi de libro quodam sententiam rogatus: bona erant, quæ intellexi, inquit, forsan & quæ non intellexi.

§ 3. Inter varias autem animalium partes, quæ iniquitatem fortunæ passæ, primo loco veniunt glandulæ, quæ, ut τῶν βεβήλων contemptum effugere sæpe non potuerunt, sic neque τοῖς ὀργίοις ἐπιστήμης τετελεσµένων censuram declinare, indicta causa, & exqvifitori examine neglecto: cum tamen talium sæpe morborum aucthores fuerint, ut, quos simplex & inculta facies in sui examen non perduxerat, quos summum Conditoris artificium in aliis manifestum in similem de his opinionem non pertraxerat, eos necessitas eo compellere potuisset, debuisset. Docent hoc anginæ, scrofulæ, parotides, bubones, cætera mala, quæ, ut summo sæpe periculo in vitalia nostra grassantur, ita mirandas humorum ex una in aliam partem derivationes non raro produnt: ut propterea investigatio earum, & ad cognoscendum corpus totius orbis nobilissimum pulcherrima sit, & ad sanitatem obtinendam procurandamque necessaria.

§ 4. Quæ Veterum de illis fuerit cognitio, si res ipsa inspiciatur, minuta valde & exilis apparet. Cum enim quædam nonnullis glandulis cum spongiis communia viderent, substitere in simili hoc, & spongiarum munus illis attribuentes, defunctos se munere suo, & rem totam detexisse crediderunt. Humano quippe ingenio familiare est, ut, si quid in eo, quod examinandum nobis proponimus, obiecto occurrerit simili modo cum re ante percepta sensus nostros afficiens, illud prius cognitum illico menti etiam invitæ denuo res præsentetur: unde fit, ut, rei magis perfectæ proprietates alteri tribuendo, ab ulteriori examine desistamus. Sic vi attractiva Magnetis observata, per Magnetisimum omnia explicare conati quidam. Sic in homine focum sibi & ollam imaginando alii, ne a simili recederent, etiam cochlearia, spatulas, opercula, coquos invenere. Sic qvi antliis vasa lympham vehentia comparant, partes, exantliatum instar, ex puteo (sic illi receptaculum chyli vocant) lympham attrahere fingunt. Nec alia ratione, cum raram in glandulis, tonfillis præcipue, texturam viderent, spongias dixere cum illis reli-

qvas. Si hisce similibus sepositis rem ipsam audire desideres, pers pauca esse, qvæ de illis cognita fuere Antiquis, offendes. Nolim tamen hæc ita dicta, ac si Veteribus, quorum autoritas mihi semper venerabilis, semper honorata, quicquam detractum eam, ut qui haud dubie pervasus sim, nihil simul & inventum & perfectum hactenus fuisse. Lumen accenderunt illi; nostrum est, ut accensum conservetur, & luculentius eundo inardescat.

§ 5. Illud similitudinum velum, quo glandularum cognitio diu obducta latuit, postquam viæ qvædam peculiæres in illis detectæ sunt, sensim cœpit removeri. Hinc enim patuit, eas nec superfluas humiditates, spongiæ ad exemplum, imbibere, nec publicam viscerum totiusque corporis sentinam esse; sed usui longe nobiliori dicatas. Cum itaque & mihi, his sacris operanti, licuerit qvædam (necdum, quod sciam, a quoquam descripta) in illis vasa notare, quæ non modo ad novam illarum dignitatem stabiliendam facere, sed & Medicæ arti lucem non omnino nullam præbere, & quædam naturæ tantum cognitæ ante vias etiam nobis notas reddere existissem, non ab re fore putavi has qualescunque observationes publico communicare, ut qui otio & manu plus valent, accuratius & Reip. Medicæ fructuosius in illa inquirant.

§ 6. Constitueram nuper itaque, Clarissimorum Præceptorum D.D. Bartholini & Sylvii iudicio obtemperaturus, ductus salivaris exterioris, vasorumque in glandula oculi innominata observatorum, aliorumque delineationem adornare, cum, Dominum Gerardum Leonardi Blasium, Hospitem quondam & Præceptorem dilectum, in suo de *Medicina Generali* tractatu ductus istius a me sibi jam ante demonstrati mentionem facere observans, præoccupatum mihi ex parte laborem illum putarem. Credideram enim, illum in ipso opere, nova accurataque, ut ait, methodo descripta, rem, cujus se inventorem in limine profitetur, quamque præter vix novi quicquam in libro illo contineri ipse testatur, accurata descriptione persecuturum, maxime cum non modo commoda se ibi offerret occasio, sed suscepta partium corporis delineatio id quædam necessitate postulare videretur.

§ 7. Cum vero accuratius verba ejus examinarem, videremque, eum ductui tam brevi, tam manifesto nec verum ortum, nec egressum verum assignare potuisse (ut patebit th. 15.), imo ipsam, e qua tam eleganti copiosissimorum rivulorum confluxu prodit, glandulam usui adeo ignobili destinasse (ut th. 17. manifestum), ut, nisi semel atque iterum

me illi hæc demonstrasse certus essem, nunquam ab illo visa credes rem, in re adeo exigua tam parum sibi constare, magnopere mirabar.

§ 8. Multum tamen debeo Clariss. Viro, quod occasionem dederit, non modo meum mihi vindicandi, sed & nova quædam alia inveniendi. Dum enim feriis Paschalibus hujus anni parotides dictas in vitulino, quo ille provocavit, rimor, & vasa, quo me trahunt, seqvor: elegantem variarum in collo glandularum per peculiaria vasa consensum non sine admiratione observo. Quibus visis, ut certior de illis fierem, secundum vitulinum caput seco, hinc & canes aperio, tandem quoque bubulum caput examino, ubi plura salivæ vasa non expectanti se obtulere. Ut itaque Præceptoribus morem geram, &, quibus magis commodum, alii accuratius illa examinent, constitui hac occasione observationum mearum qualemcunque delineationem dare, veniam, sicubi forte errare contigerit, a peritioribus mihi promittens.

§ 9. Quæ continuum ori humorem suppeditant, glandulæ non unæ sunt, nec uno in loco sitæ. Nam præter maxillares & tonsillares, a Clariss. Whartono descriptas, alias observavi sub auribus, in buccarum regione, sub lingua, in palato: quæ omnes in eo conveniunt, quod ex plurimis glandulosæ carnis quasi fragmentis, imo glomis fibrarum, nervorum, vasorumque, & membranarum ope inter se connexis sint compositæ, adeoque ex earum genere, quas conglomeratas Celeberrimus Vir Franciscus Sybivius appellat. Glandulæ quippe omnes proprie dictæ, licet parenchymata sint sui generis non sanguinea, sed alba, pingvia, venis, nervis, arteriisque, & vasis lymphaticis prædita, varias tamen, variis fundamentis nitentes, admittunt differentias: quas inter nulla rem propius attingit ea, quam Vir Clariss. modo nominatus proponit. Ille enim non vasa, utpote quæ necdum in omnibus detecta, nec usum, quippe minus adhuc cognitum, sed ipsam conformationem respiciendo duo primaria illarum genera, *Disp. Med. 5 de Lienis & Glandul. Usu* th. 26. & 27., describit: sunt enim aliæ ex variis quasi partibus & minoribus glandulis conglomeratis, & cum aliqua superficiei suæ inæqualitate conglutinatis exsurgentes; aliæ vero æqualem superficiem habentes, & ex una quasi sibi continuata substantia conflata & conglobata observantur: cui postremo generi & hoc peculiare est, quod altera parte convexum lymphatica ut plurimum excipiat, altera vero concavum orta interius ex plurimis tenellis rivulis alia lymphatica ex se emittat. Ut autem glandularum, sic & lymphaticorum, ob contenti colorem Clar. Bar-

tholino ita dictorum, duo genera reperiuntur. Qvæ enim in conglobatis visuntur, omnia liqvore suum in venas reducunt, cum illa, qvæ e conglomeratis prodeunt, contenta in cavitates notabiles, ut sunt oculi, nares, os, intestinum tenue, deponant.

Licet autem *stomaticæ glandulæ* (sic enim, qvæ ori proxime inserviunt, omnes communi nomine possunt insigniri) ejusdem generis sint, similiaque vasa possideant, numero tamen vasorum distincti videntur, qvædam enim unico duntaxat excretorio vase prædita sunt, ut qvæ sub auribus & sub maxillis reperiuntur, qvædam pluribus, ut reliqvæ quatuor, qvæ nempe in buccis, sub lingua & in palato observantur, ut & tonsillæ, cum vero tonsillas una cum maxillaribus inferioribus earumque vasis *Whartonus* descripserit, ea, qvæ ab aliis descripta nondum scimus, proposuisse contenti, actum agere nolumus.

§ 10. *Sub auribus sitæ glandulæ*, ut bene se habentes peculiare nihil & a cæteris distinctum Veteribus exhibuerunt, sic nec proprium sibi nomen apud eosdem invenere. Videtur quidem *Hippocr.* *Lib. de Gland.* hac descriptione illas indiguisse: ἀδένες δὲ κατὰ τοὶν οὐάτοιον ἐνθα καὶ ἐνθα ἐκατέρωθεν κατὰ τὰς σφαγὰς τοῦ τραχήλου; si vero facta hic loci glandularum enumeratio conferatur cum recensione earundem brevi post in eodem tractatu proposita, facile patet, descriptionem hanc generalem esse omnibusque jugularibus eo tempore cognitis communem, quas paulo infra παρίσθημα vocat, prout & *Zwingerus* in tabulis exponit, & ipse author, verborum suorum optimus interpres, manifeste declarat, dum se περὶ ἀδένων οὐλομελῆς τραχήλου acturum ait. Qvas autem Parotidas dixerunt Veteres, non ipsæ glandulæ fuere, sed sub auribus, vel post eas, observati tumores, quos alias ἐπάρματα & φήρεα nominarunt. Sic τὰ παρὰ τὰ ὦτα, quorum toties apud *Hippocratem* mentio, licet proprie & per se considerata potius, qvæ naturaliter ibi reperiuntur, designent; si tamen ipse divinus senex consulatur, præters naturale quid hac voce intelligendum vult. Hinc *Epidem.* I, sect. 3: οἷσι δὲ τὰ παρὰ τὰ ὦτα γίνοντο, quo loco, ut, qvæ cætera proferre liceret, taceam, satis manifestum est, morbosum quid hoc nomine venire, idem scilicet, quod Græcam vocem Latina civitate donando *Parotida Celsus Pliniusque* appellarunt. Licet itaque hæc verbi vis apud illos fuerit, cum tamen ratione sui morbi subjecto non minus quam morbo conveniat, non incommode, ut communiter fit, ipsis glandulis posset concedi, si plures & diversi generis

eodem in loco non reperirentur. Superiorem enim anno jam præcipite, cum in Nofocomio praxin faciendo quotidie doceret Clariss. *Franciscus Sylvius*, exhibuit tum discipulis, tum quibus interesse libuit aliis, inter cætera, quæ data occasione aperiebat cadavera, scrofulis affectas in quodam conglobatas omnes non in reliquo modo corpore, sed & circa aurium regionem, salivarium utraqve cum pancreate integra existente. Ut itaque distincte confiderentur, poterit hæc, de qua nobis sermo est, *parotis conglomerata* appellari, nomine conglobatarum parotidum reliquis relicto.

§ 11. *Parotis conglomerata* (ut in vitulo observatur) in fovea sub auricula, inter posterius inferioris maxillæ latus processumque mastoideo respondentem conspicua, super ossis hyoidis cornu sita est, figura plane irregulari, utpote quam circumfitarum partium asperitates & eminentiæ admittunt. Notandum tamen, inferiorem ejus partem in longum extenuatam esse, media crassiore existente: unde superiora versus anterior pars in limbum expansa, oblongam aliam & conglobatam fere totam sinu suo abscondit, quem præter sinum variæ pro vaforum, præcipue vero nervorum, qui & magni & copiosi per eam in alias partes distribuuntur, transitu viæ notantur.

§ 12. Magnitudinem pondere expressit Dn. *Whartonus*, qui facta hujus cum reliquis comparatione observavit parotidem pendentem 3iiijss, maxillarem internam 3ijss. In foetu autem vaccino hujus pondus 3ij æquare, illius vero 3ij deprehendit. Idem refert, se in eqvo executisse unam, quæ pendeat 3xj, nec tamen præternaturalis erat, aut solito tumidior. Quibus Clariss. Vir copiam materię expressisse videretur, extensione non determinata, nisi jam ante constare putasset, materiam in utraqve eodem modo esse dispositam, quod & innuit, dum substantiam utrique similem adscribit. Ne tamen hujus ad illam proportionem exacte observatam esse credam, svadet, præter nervos majores copiosioresque per superiorem delatos, minor majori inclusa glandula, quam, utpote a reliqua non distinctam, pondus illius auxisse puto. Nam in bubulo inveni parotidem dictam, a vasis & sibi apposita conglobata liberatam, pendere 3iiijss, cum maxillaris inferior 3iiij tantum adæquaret.

§ 13. Vicinis partibus fibrarum vaforumque & præcipue nervorum ope annectitur. Nervi enim quinti paris ramus durior, insignibus eam furculis variis in locis perforans, tam superiora quam inferiora versus propagines mittit, quæ tum variis in locis, tum præ-

cipue glandulam inter & reliquum, cui apponitur illa, caput, inter se varie concurrentes, plexum quendam formant. Quos præter alii, a ramo temporalem musculum inter & maxillam antrorsum delato reflexi, ad vasis excretorii latus retrorsum in ipsam glandulam feruntur. *Vasa*, quæ ibi reperiuntur, trium generum sunt. Nam præter venas & arterias, a jugularium carotidumque exteriorum externis ramis subministratas, etiam *peculiare vasculum* obtinuit, quod in ovillo capite superiori anno Amstelodami a me repertum. Cum enim, a D. Gerar. Leon. Blasio, Clar. Gymnasii Amstelodamensis Professore, circa festum Paschatos hospitio exceptus, in illo, cui sexta ab adventu meo lectione finem imponebat, collegio commodam animalia exercitio Anatomico convenientia habendi occasionem animadvertentem, obtinui ab illo, liceret empta mihi subjecta privatim dissecare, ut, quæ a diversis in arte Anatomica exercitissimis viris observaram hactenus, & mente revolverem, & manu imitarer. Jamque eo nomine VII. Aprilis, quod mihi comparaveram, ovillum caput solus in museolo adornabam, cerebrum dissecturus, cum in sui me examen decurrentes per ora venæ & arteriæ rapiunt: quæ dum stylo varie scrutor, sentio me, per vas aliquod in amplam oris cavitatem delatum, ipsos dentes ferire. Miratus rei novitatem Hospitem voco, sententiam ejus auditurus, qui, cum primo vim, mox ludentem Naturam accusasset, tandem *Whartonum* accuratius examinandum judicabat.

§ 14. *Oritur autem Vas illud salivare intra nominatam sæpius parotidem conglomeratam pluribus e rivulis in unum alveum confluentibus, qui inde, in vitulino, ut & in ovillo, versus inferiora delatus, ab inferioris maxillæ angulo ad finem lateri ejus imo insculptum tendit, unde oblique antrorsum adsurgens tandem foramine satis amplo, papillarum summæ & postremæ ad molarium secundum sitæ insculpto, in partem oris exteriorem patet. Notandi in eo præter propriam tunicam varii nervi funiculi, qui, nil nisi plurima filamenta repræsentantes, utrinque ad latera ejus feruntur, & hinc inde per prædicta filamenta sibi mutuo innexi medium ductum amplexantur. Non mirum itaque, difficulter adeo per divisas tunicas in cavitatem ipsam intrudi stylum, cum, inter nerveos funiculos hærens, ab ulteriori progressu impediatur. Si in homine rectum ejus tramitem, quo glandulam inter & buccinatoris medium fertur, consideramus, videtur idem esse cum robusto vinculo, quod, e centro*

buccinatoris exterius enatum, os genarum perreptare, & in musciculum quendam parvum & gracilem buccæ directe oppositum terminari, Cafferius scribit. Plura de eo, ut in homine observatur, licet a prædictis non multum differant, cum sciam, Clariff. Præfidem in suis ad Vefalium commentariis id acturum, hic non addam.

§ 15. Videamus, qva ratione prædicta describat D. Blasius. *Medicin. General.* p. 63. hæc leguntur: *Saliva est humor &c., ex fero maxime constans, caloris ope a massa sanguinea in glandulis maxillaribus segregato, & hinc per ductum salivalem in maxilla superiori æque ac inferiori notabilem ad glandulas oris anteriores delato, ut inde motu lingvæ expressus inferviat gustationi &c.* Ergo terminus a qvo, glandulæ maxillares, terminus ad quem, glandulæ oris anteriores; ut motum lingvæ, qvi ad expressionem parum facit, taceam. Glandulas autem maxillares eodem libro p. 23. sic describit: *Maxillares glandulæ, tam qvæ externæ, in media fere longitudine maxillæ inferioris sitæ, qvam qvæ internæ, a parotidibus usque ad mentum sese varia magnitudinis colorisque specie exhibentes, ductu singulari ab usu salivæ dicto gaudentes &c.* Cum vero ab internis internum ductum procedere Whartonius, & post eum in prima de ductibus salivaribus disputatione Clarissimus Præses Johannes van Horne ostenderint, ab externis exterioris origo secundum eum deducenda. Certe si accuratius Whartoni verba, unde descriptionem hanc desumpsit, examinaisset, vidisset facile, tanto ductui illas nulla proportionem respondere. Sic enim laudatus sæpe Doctissimus Vir cap. 21. eas delineat: *Maxillares externæ exiguæ admodum sunt & minoris momenti; sitæ sunt exterius in media fere longitudine maxillæ inferioris.* Sed quid verbis opus, cum ipsa experientia loquitur? Admoveat inquisitioni manum, & qva veritate hæc dixerit, facile inveniet: nec est, quod quis existimet, eum maxillarium externarum numero salivares exteriores adscribere; ne enim hac ratione posset excusari, ipse sequenti capite egregie cavit, ubi eas a prioribus distinctas parotidum nomine describit. Eadem fide terminum ad quem proponit: vidit enim, qvo modo inferiores terminentur; hinc non erraturum se credidit, si exterioribus similem tribueret insertionem. Sed longe aliter scripsisset Clarissimus Vir, nec glandulas, unde motu lingvæ exprimeretur saliva, finxisset, si unquam per foramen in egressu conspicuum vel in brutis, vel homine styllum in ductum immisisset. Sed de his satis, ad rem redeamus.

§ 16. Qvin alia dentur vasa præter jam dicta, non dubitarem, quandoquidem non modo a simili ad maxillarem anteriorem sita conglobata glandula in ipsam maxillarem ductum quendam deferri, & Whartonus observavit, & ego in vitulino capite viderim; sed etiam ab ipsa conglobata, quam salivaris exterior includit, in salivarem derivata vasa notarim; cum tamen, quia breviora & exilia, distincte non fuerint a me observata, in medio illud relinqvam. Hoc tamen de conglobata parotide addam, vidiſſe me in agno pluſcula lymphatica in eam delata, quæ, ab extremis narium & aliis partibus anterioribus orta, super musculos recto tramite deferuntur. Primam quidem originem non licuit invenire; quæ tamen rimabar, omnia ex glandulis oris anterioribus videbantur originem ducere.

§ 17. *Exposita sic partium illarum historia, reliquum est, ut ad usum deveniamus.* Tres autem usus a Doctissimo Whartono glandulæ huic tribuuntur: 1. Nonnullas durioris rami nervi quinti paris superfluitates excipere, & reducere in venas, 2. aurem & auriculam calore suo refoſcillare, 3. foveam illam in auris ambitu explorare & complanare; sed non mirum, hæc a Clarissimo Viro proposita, quandoquidem præter vasa cæteris partibus communia nihil in illa observavit; quod ex paragraſo præcedenti ejusdem capitis patet. Verum, inquit, si velint authores, hæc glandulas humectare partes affundendo per vas aliquod proprium humorem peculiarem: oportet, nobis ostendant vas illud, humoris ab hoc oriundi speciem, & modum, quo pars, humorem excipiens, se quoque expediat. Quod cum jam detectum sit, facile patet, nobiliori eam muneri vacare. Non video autem, quia ratione D. Blasius excusari possit, qui repertis frugibus glande vescitur, qui, licet ductus inventorem se venditet, nihilo tamen minus, ut descriptionem, ita & usum ab illo assignatos suos facit, licet mutilate: primum enim truncatum proponit, tertium omittit: namque p. 24. *Medicin. General.* ait: glandulas, cum maxillaribus substantia convenientes, circa radicem auriculæ externæ locum maxime habere; hinc auriculam totam cingere, ut superfluitates recipiant (terminos unde & quo reticendo), auremque calore suo foveant. Qvis eorum, qui viderunt ductum salivæ ad hanc usque glandulam continuatum, qui in hac glandula insignes ductus ejusdem radices magno numero elegantissime distributas conspexerunt, credet, D. Blasium, si ductus salivaris investigationi manum unquam admovisset, usum tam ignobiles parotidibus fuisse adscripturum, parotidibus dico, quas, licet substantia cum max

illaribus convenire viderat, usu tamen convenire non poterat suspicari. Si difficilis indaginis res esset, si vas longum & per varios anfractus deducendum, si tenerum & rupturæ obnoxium, liceret varias excusationes adferre; jam vero cum breve sit, cum in exterioribus obvium, cum densum & robustum magis ac aliud ullum, cum ipse in suis ad me litteris rem facilem & nunquam non obviam agnoscat, quam bene sibi constet, ipse videret. Sed hæc mittam. Verus parotidum conglomeratarum usus, illam, quæ per ductum salivarem exteriorem in exteriorem oris cavitatem excernitur, salivam præparare, quæ de re, ubi reliquas salivæ glandulas descripserimus, infra pluribus agemus.

§ 18. Inter eas, quæ pluribus excretoriis vasis donatæ sunt, primo loco veniunt, quæ in buccis reperiuntur, ut inter cæteras, tum glandulæ, tum vasorum magnitudine, maxime conspicuæ. Hæ autem totam buccarum regionem occupantes exteriorem oris cavitatem undique ambiunt, & sursum deorsumque ad gingivas pertingentes, musculos inter & tunicam oris feruntur. Inferiore sui parte crassiores sunt, hinc tenuiores redditæ, venis arteriisque & nervis, tum in hanc, tum in anteriora transmissis, liberam per exteriorem superficiem viam concedunt. Poterat vasorum mox describendorum ratione dividi in partem inferiorem, quæ crassitie & soliditate reliquis prior, mediam, quæ tenuissima, & superiorem, quæ medio modo se habet; colore cum parotide in bubulo conveniebat.

§ 19. Præter dicta vasa peculiare in illis ductus 21. Maji observavi, cum crassiorem ejus partem transversam paulo obliquius dissecarem. Hanc enim conglomeratam videns etiam, conglomeratarum exemplo, sui generis vase donatam putabam, quod non fefellit. Vix enim divisa erat, cum per resectum eodem ictu vasculum immissus stylus in cavitatem oris libere penetraret; hinc totum buccarum corpus ab inferiori maxilla prope gingivas resecando, & extendendo aliquantulum membranam, video plures in eadem recta linea exitus hiatus, per quos immissus stylus in ipsam glandulam facili negotio viam invenit. Oriuntur autem ductus, proceduntque non uno modo. Intra crassiorem, quæ inferior est, glandulæ partem quidam, ex plurculis radicibus in singulares truncos concurrentibus orti, cum in via sunt capaciores, ubi ad membranam interiorem adscenderint, fere ad gingivarum inferiorum altitudinem foraminibus illam pertundunt quadruplo, quam ipse ductus est, angustioribus in eadem

linea secundum totam maxillæ inferioris longitudinem dispositis; infra quæ ad aliquod intervallum exiguæ semiglobosæ protuberantiæ apparent, nullæ acutæ, quæ alias ad digiti supra prædicta foramina altitudinem copiosæ conspiciuntur; in media quoque parte excretoria vasa copiosa adfunt, sed admodum brevia, vixque, nisi per expressum humorem, conspicienda, dum, quæ a superiore descendunt, paulo sint manifestiora.

In homine buccarum glandulas salivæ dicatas superiori anno observavit Clariss. *Sylvius*, licet vasa nondum essent detecta. Cum enim haberet ægram buccarum ulceribus laborantem, & interdum limpidam inde aquam salivæ æmulam manare videret, data in Nosocomio occasione buccas examinando, glandulosam illarum carnem nobis demonstravit. Sed &, quæ apud *Aqvapendentem* leguntur de humore aqveo per relictum a curato buccarum vulnere foramen quotidie stillante, idem arguere videntur.

§ 20. Tertio loco *Sublingvales* se offerunt, quæ, utrinque ad linguæ latera sitæ, ejusdem generis cum proxime præcedentibus sunt, nisi quod vasa excretoria obtinuerint, non quidem breviora, sed angustiora. Oriuntur intra ipsam exilibus rivulis, &, hinc sibi invicem parallela, a lingua versus gingivas recedunt, ubi ad digiti fere a dentibus distantiam vix conspicuis, nisi premantur, ostiis per tunicam hiant. Nullæ ostiis, nisi ad aliquod intervallum, protuberantiæ adfunt, sed, ut in buccæ vasis dictum, ubicunque vascula prædicta tunicam penetrant, ibi æqualis est & plana. An in papillis etiam sinuli adfint, non licuit observare. Compressi aliquot, sed nihil expressi; hinc, resectas examinando, vidi, glandulosa frustula esse, quæ reliquas supereminentia tunicam ibi loci in acumen elevant.

§ 21. Ultimas *Palatinas* appellare visum mihi, cum revera tota palati caro, ut in brutis, sic & in homine, nil nisi conglomerata glandula sit tonsillis continuata; unde innumeri exiles ductus produnt, qui, ipsam membranam perforantes, quasi cribrum inde forant. Notavi illos primum 27. Maji, cum bubulum caput jam totum fere dissecuisssem; tunc enim, cum tonsillas excinderem, vicina premendo tenacem inde humorem excerni videbam. Hinc totum, quod coelum oris constituit, exsectum, digitisque compressum, innumeras glutinosi humoris guttulas per tenella foramina erumpentes exhibuit. Qui a pituita palati, quam tertiam sputi speciem Clar. *Whartonius* *Adenogr.* c. 22. constituit, plane diversus est; quod ex ipsius expli-

catione manifestum, dum e naribus supra palatum illam exfugi statuat, & cerebri pituitam appellet: quod huic minime competit.

Cum in illo jam essem, ut præsentia typographo committerentur, accepi Clarissimi *Schneideri De Cafarrhis* librum tertium, ubi ille sect. 2. c. 3. mentionem facit *membranæ pituitariæ* in extremo palato observatæ, unde pituitam exsudare vidit. Revera autem, præter membranam ipsam pluribus foraminulis pertusam, *glandulosa* caro sub tota illa membrana reperitur.

EXPLICATIO FIGURARUM

Fig. I.

- a. *Parotis conglomerata.*
- b. *Parotis conglobata.*
- c. *Lymphaticum ex conglobata deorsum tendens.*
- d. *Radices ductus salivaris exterioris.*
- e. *Truncus ductus salivaris.*
- f. *Venæ jugularis rami exteriores.*
- g. *Nervi, qui, ut intra glandulam & caput, sic & extra illum locum, ut in*
- h. *sibi innectuntur.*
- i. *Nervei funiculi ductum salivarem comitantes.*

Fig. II.

- a. *Ostia vasorum, a glandula buccarum inferiori prodeuntium, quorum nonnullis seta immissa est.*
- b. *Apertio ductus salivaris exterioris in papillarum summa & postrema occurrens. Reliqua puncta innuunt cætera foramina, per quæ compressione viscidus humor exit.*

Fig. III.

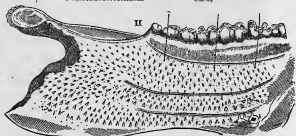
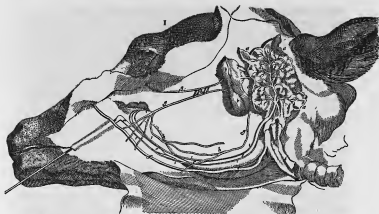
- a. *Glandula sublingualis.*
- b. *Vasa ejus.*
- c. *Vasorum excretoriorum oscula.*
- d. *Sinus ad latus lingvæ observatus.*

Fig. IV.

- a. *Foramina palati, per quæ lentus humor exprimitur.*
- b. *Tonsillæ.*

Fig. V.

Vasculum unum ex illis, quæ e glandulæ buccarum inferiore parte prodeunt.





§ 22. Vidimus hactenus *glandularum stomaticarum historiam*, de quarum vero usu non est, quod multa addamus. Cum enim vasa peculiararia sint detecta, nemini dubium esse potest, quin illarum munus sit, *qui in ore perpetuo reperitur, humorem præparare*. Ut autem in ore cum inferioribus superiora, interiora cum exterioribus madererent, plura data sunt vascula ad humorem omnibus æqualiter communicandum, per quæ etiam, quando opus, copiosa excerni poterit saliva. Sic raram inter alias historiam refert Clariss. Bartholinus de nobili, qui, quotiescunque cibum sumit, larga sputatione laborat, extra illud tempus nihil, neque inter loquendum, exspuens, etiam si liberalius quandoque amicorum in gratiam invitatus potest. Non itaque opus ad occultas confugere vias, ut, qui in *salivationibus*, vel sponte quibusdam in morbis subortis, vel apophlegmatismorum usu provocatis, excernitur humor, inde derivetur.

§ 23. *Masticatoria* enim quod attinet, sive palato illinantur, sive dentibus agitata ore detineantur, non poterunt non subtiliores partes caloris diffundentis ope per aperta foramina in glandulas brevioribus vasis excretoriis instructas penetrare, & visceri humori promovere secretionem. Sic & in nares attracta *errhina*, & glandulosas partes, quæ ibi reperiuntur, penetrantia, ad feroci humori eductionem multum conducunt. Nec est, quod miretur quis, me per idem vas & in glandulas medicamentum & ex illis excrementum deducere. Cum enim vasa excretoria patentia sint & breviora; cum medicamenta hoc agentia acriter, subtilium partium, & calore facile mobilia: non poterit nec illorum dispositio, nec horum vis in dubium vocari.

§ 24. Quod *Salivationes*, quibus morbi interdum solvuntur, spectat: videtur etiam illarum explicationem prædictorum *vasculorum* consideratio clariorem reddere. Quam enim Celeberrimus Vir Carol. Piss. De Morbis a Serof. Coll. sect. 1. theor. 4. ex capite per membranas nervosque gliscere & depluere aquam putat, ex prædictis glandulis putarem derivandam: sic sect. 2. part. 1. c. 2. refert, splenetico & sputatori perpetuo tumuisse interdum genas insigniter, sed indolenter, cumque tumorem dialem fere, vel insensibiliter, vel cum plurima salivatione, solutum. Et paulo post ait: tumores genarum, ut & glandularum aurículas circumjacentium, nec non glandularum colli indolentes, vel ab apricatione, vel a frigore autumnali excitatos, & paucas intra horas in immanem molem excrescentes, interdum diem intra naturalem solvi, vel insensibiliter, vel cum multa sputatione.

Scilicet hæ partes, aëri partim extrinsecus ambienti, partim interiora oris, dum respiratione attrahitur, lambenti expositæ, facile ab illius injuriis in subiecto disposito afficiuntur; quod si itaque in hisce a calore frigoreve affectis partibus detineatur materia quædam, manifestæ adfunt viæ, per quas inde poterit excerni.

§ 25. Magnum autem dubium de origine humoris ora rigantis occurrit. A cerebro alii per occultas vias, alii a succo per nervos delato, quidam a sanguine arterioso, Nobil. *Bilsius & Bilzio* favens Clariss. *Anton. Deusingius* in *Exercitat. Phys. Anatom. de Alimenti in Corpore Depur.* § 83. a rorifero succo, per vasa communiter lymphatica dicta advecto, illum derivant. Nos in præsens hoc tantum agemus, ut ostendamus, sanguinem arteriosum huic muneri aptum esse; nervos autem, aliis usibus destinatos, non frustra glandulis datos; lymphæ vero, seu rorifero succo, illum usum non, nisi reclamante omni & ratione & experientia, posse attribui. Quod antequam aggrediar, de ipso humore pauca tantum præmittam, cum uberius ejus consideratio Chymicam Anatomem requirat.

§ 26. Videtur autem, qui in ore naturaliter reperitur, humor omnis salivæ nomine commode posse insigniri, cum aliud magis proprium se non offerat. Qui enim sputum vocant, non eum, qui naturaliter adest, sed qui naturæ molestus excernitur, illa voce exprimunt. Hic autem, de quo agitur, melioris notæ est, quam qui excerni debeat, si quis alias intra diætæ limites se continuerit. Quod illorum exemplo patet, qui nunquam in vita per nares aut ora quicquam excreverunt: Inter quos primarii fuere Persæ; νόμιμον γὰρ δὴ ἦν αὐτοῖς μήτε πτύειν, μήτε ἀπομύττεσθαι. Quippe frugalibus, & semel tantum in die cibum assumentibus, lex ea observatu facilis erat. Divini namque Hippocr. autoritate: μῦξαι καὶ σίελα πλησμονῆς ἐστὶ κρίσις, a qua repletionem nullum ipsis periculum erat.

§ 27. An saliva omnis ejusdem naturæ sit, dubium videretur, cum non uno in loco omnis præparetur. Si glandularum vasorumque, quæ tum afferunt, tum efferunt, species consideres, nullam agnosces diversitatem. Conglomeratæ namque omnes sunt, & in omnibus ejusdem generis vasa reperiuntur; tria tamen sunt quædam differentiam arguentia. 1. Color, qui non omnibus glandulis semper idem; rubent interdum parotides, & in buccis sitarum inferior pars, superiore cum tonsillis, palatinis & sublingualibus ad flavum inclinate, cum maxillaris inferior ut plurimum palleat. 2. Vasorum con-

formatio, quibusdam enim glandulis unicum duntaxat est, ut maxillarium inferioribus, & illis, quæ sub auribus reperiuntur: aliis plura, eaque vel exigua, ut palatinis, tonsillis & buccarum superioribus; vel aliquanto longiora, ut in sublingualibus & inferioribus buccarum. 3. *Humoris consistentia*, qui in longioribus vasis minus, in brevioribus magis viscidus reperitur. Sed cum coloris illa diversitas semper locum non obtineat, vidi enim in vitulo, hinc & in agno, omnes eodem pallore insignitos; cum consistentiæ difformitas non in omnibus eadem, expressi quippe non semel ex ductu magno, tam superiori quam inferiori, materiam lentam & tenacem: relinquitur vasorum diversitas in sola magnitudine consistens, unde contenti diversitatem inferre non licebit.

§ 28. Si, ut ex ore prodit, inspiciatur saliva, colore & perspicuitate aquæ aliquantulum cedit, cum radii lucis in illa, quam in aqua, paulo majorem subeant mutationem; quæ autem spumosa exspuitur, non sibi, sed lingvæ & oris motui hoc debet, cum eodem modo lac, cerevisia, imo ipsa aqua spumosa esset dicenda; digitis si explores, lentam senties & viscidam, atque lubricandi vim habentem, ideoque aqua minus mobilem, magis difficulter divisibilem; saporem in sanis nullum invenies, ut nec odorem. Quam itaque sapor & odor ἀποιον judicant, eam visus & tactus aqua minus simplicem decernunt: & revera, si alios effectus consulere placet, singularem in ea compositionem animadvertere licebit. Simples liquores, quales in naturalium examine occurrunt, non nisi sui, aut medii generis, alia facile sibi patiuntur admisceri; & si forte heterogenea quædam, non mediante tertio, agitatione quadam illis fuerint confusa, statim sibi relictæ, vel, si frigore juncta, leni igni impositæ, aut, si majori calore commixtæ, refrigerescentia, farcinam non convenientem deponunt. Sic aqua, saltem præter & spiritum, aut his temperata, nihil sibi patitur admisceri: admittit eadem oleum, sed oleum aquæ sine medio qui conjunxerit, nondum repertus. Spiritus aquæ & oleo jungi poterit, non autem sali, nisi singulari artificio, quod inter arcana artis Chymici sibi reservant; patet hoc, si oleo tartari per deliquium spiritum vini rectificatum affundas, utcumque enim agitaveris, statim summa petet spiritus, tartaro ad imum detruso. Salsis acida facile miscentur, sed, si exquisitæ talia, non sine effervescentia. Saliva vero omnia ferre valet. Sive enim intra corpus, sive extra examinaveris, nihil invenies, quod illa re-

spuat, nihil, cui sine pugna non associetur. Hinc & ore assumenda quævis illi, tanquam universali menstuo, primo statim ingressu junguntur; hinc & ventriculo contentis illa continuo, nobis ne attentibus quidem, deglutita jungitur, ut alimentorum dissolutio promoveatur. Esse itaque non simplicem liqvozem, sed mixtum, idque singulari proportionem, ex ante dictis patet. Sed & alia in promptu sunt argumenta, quibus, non simplicem esse liqvozem, demonstratur: namque & evaporatio salem mihi (cum mane aliquando vitro exceptam, quæ limpida, & ab omni mucis consortio liberata erat, ignis examini subjicerem) exhibuit; & Mercurii mobilitas ab illius commixtione impedita, quam mortificationem vocant, oleosi acido temperati præsentiam arguit; ut nihil de variis viribus in Medicina decantatis, quæ sine principiorum activorum virtute non sunt, subjungam. Non possum itaque, quin Clarissimi Sylvi in humorum corporis nostri examine chymico, non minus quam in corporis anatomica resolutione versatissimi, suspensionem magis quam probabilem esse admittam. Ille namque existimat, *esse in saliva multum aquæ, parum spiritus volatilis, & minimum salis lixiviosi, cum olei spiritusque acidi tantillo mixti temperatique*. Quod variis exemplis latius posset explicari, nisi instituti nostri ratio alio nos vocaret.

§ 29. Examina sic cum glandulis saliva, reliquum est, ut vias materiam ejus advehentes indagemus. Quod ut commodius fiat, partes, cum quibus glandulæ commercium habent, singulas proponemus, & quibus mediis vel aliquid inde accipiant, vel eo mittant, inquiramus, ut suis singulis attribuaturs usus.

§ 30. Primo itaque, venas cum habeant & arterias, nulli, cui sanguinis motus in orbem cognitus, dubium est, quin aliquid a corde recipiant, eique iterum remittant. Quandoquidem autem quidam eas, præter calorem, nihil sanguini debere asserant, communiter vero & nutrimentum illarum, & qui in illis secernitur, humorem inde arceffant: nos in præsens, donec contraria sententia certis experimentis fuerit comprobata, receptam communiter opinionem arripimus. Ne autem vel supponere aliquid, vel sola autoritate niti videamur, rationes afferemus, quibus inducti Veterum castra non temere judicemus deferenda.

§ 31. Si ipsum sanguinem, & quæ in illo tum Natura, tum ars demonstravit, partes inspicimus, rationi valde consentaneum videtur, illum totius corporis velut promum condum esse dicendum.

Cum enim omnia, quæ in partibus reperiuntur, qualiacunque five Veterum, five Recentiorum velis elementa, etiam in sanguine possint demonstrari; cum sanguis hic, omnis generis principia in se continens, ad partes singulas deferatur; cumque, ex alimentis quæ oritur, chylus hanc πανσπερμίαν ad singulas partes deferendam continuo restauret: nihil ob stare video, quo minus omnia, quæ singulæ partes tum ad sui nutrimentum, tum ad peculiare humores elaborandos desiderant, inde possint deduci.

§ 32. Obijciunt hic quidam, in omnes partes non deduci sanguinem, quod sensuum testimonio probant; sed quantum valeat a sensibus, & quidem non omnium, sed quorundam, desumpta negans argumentatio, si aliunde non patuisset, sola Anatomicorum historia potuisset docere. Nec enim valet: ego vel alius nondum vidit, ergo nec id est. Si enim, quæ magna sunt, quæ colore se ipsa produnt, ut lacteas & cætera, non viderint, nisi ab aliis per accidens primum observata, quid mirum, exigua vasa non semper conspici? viderunt tamen alii, & nos quoque vidimus, in medio cerebri corpore, in spinali medulla, in ipsis membranis arterias involventibus, in membranis ductus salivæ inferioris, nec non inter nervorum quinti paris funiculos, communi membrana involutos, ut & funiculos tertii paris, manifesta sanguinea vasa, præsentè Clarissimo Viro D. Olao Borrichio, Profess. Reg. Hafn., quondam etiam Præceptore semper honorando, quæ plerisque, quorum hic a me mentio fit, experimentis una cum aliis adfuit amicis. Et quid aliis partibus sanguinea vasa denegamus, cum ne candidissima quidem oculi tunica illis destituta sit, ut in oculi inflammatione conspicuum?

§ 33. Nec est, quod colori tantum tribuamus, ut cum cerebro, tunica, oculi humoribus, ossibus, tendinibus, &c. dissimilis appareat sanguis, ideo etiam peculiare humores, per vasa peculiaria eo deferendos, quæramus, quasi omnia, quæ in rubente hoc succo latent, etiam essent rubicunda, nec possent sub purpureo velo albicantia recondi. Quis quæso eorum, qui σύγχρισιν rerum & διάχρισιν admittunt, quæ aliquod Chymicæ præcium ponunt, ignorat, quam infidum sit coloribus credere? quis non vidit idem brevi tempore, ne dicam momento, ex albo nigrum, ex nigro album redditum, paucis accedentibus? quoties adspicere licet elegantissimo rubore splendentes, ut vocant, tincturas momento pæne albas reddi? Ut cætera taceam, unicum, sed, ut puto, evidentissimum, exemplum præbebit

bezoardicum minerale; quis crederet, sub fulgentissimo rubore, & quidem perspicuo, qui oritur, si spiritum nitri butyro antimonii affundas, latere tam albicantem materiam? Quid ergo mirum, licet sanguis ipse non videatur spermaticis nutriendis similis, posse tamen illi, corpori opaco, crassius & fibrosis partibus scatenti, immixta esse varii coloris alia cum partibus illis convenientia. Ut jam nihil de *Benneti* experimento, quod in sanguine fecit, dicam; nec, quod *Pecquetus* in fero observavit, referam. Parum itaque militat hoc illorum argumentum: sanguis omnes partes nutrire nequit, quia multis est colore diffimilis.

§ 34. Sed minus adhuc urget illorum argumentum, qui album hoc a sanguine secretum chylum esse volunt, & hinc inferunt: inas nem Naturæ laborem affingi, quæ chylum primo sanguini misceret, hinc ab eodem denuo eundem secerneret; quo nihil magis prudentiæ ejus, quæ per rectam, ut loquuntur, lineam omnia agit, repugnat. Sed propria cum larva luctantur. Non enim quodcumque a sanguine secretum, licet colore respondeat chylo, ideo chylus dici meretur. Quot enim dantur liqvores lactei, quos ex solo colore nemo, nisi *Democritus* forte aliquis, a se invicem discerneret? Exemplo fit lac virginis, ut Chymici vocant, lac tithymallorum, lac cichoraceorum, emulsiones variae, & in animali orbe ut permaneant, licet ex animalibus diversissimi generis quod procedit lac colore parum, ne dicam nihil, differat, viribus tamen differre, noto notius est. Possunt adeoque chylus, qui sanguini miscetur, quique inde secernitur nutritivus succus, licet colore inter se conveniunt, multum tamen, quia reliqua accidentia, differre. Adspiciamus adhuc semel bezoardicum minerale: nonne quod abstracto nitri spiritu remanet, album est, licet in rubundissimo & valde pellucido liqvoe nemo observasset? ideoque autem dicerem, hoc a butyro antimonii non esse diversum? Taceo, quod necdum observatum, illud, quod in solidarum nutrimentum abit, lacti penitus colore respondere, cum varii, & quidem fere infiniti, alboris dentur gradus. Dein, si calido in alterationibus primas deferimus, qui poterit immixtus sanguini chylus cum eo per cor reliquumque corpus deferri, & tamen eandem servare naturam, i. e. non magis coqui, attenuari, & nutriendo aptior reddi? Quod si vero mutatur secundum reliqua accidentia, licet color idem redeat, non tamen ideo confusio hæc & secretio pro inutili labore habendæ.

§ 35. Qvòd vero dicunt, sangvinem nutriendis partibus magis volatilem esse, alimentum autem crudius requiri, validissimum videretur, si totus sangvis adeo esset volatilis. Cum vero ipsi varii generis partes in eo admittant, nec chylum excludant, facile patet, etiam crudiores ibi adesse, si ad nutritionem essent necessariæ; de quo licet dubitari non sine ratione possit, cum partium solidarum non exigua sit differentia, & præterea humores varii & ipsi spiritus longe aliud indicent: ne tamen extra oleas nimium vager, sufficit, cum variæ sint partes alendæ, varias quoque in sanguine reperiri. Quæ enim de succo benigno & chylo propinquire loquuntur, metaphorica partim sunt, partim non necessario cohærentia. Nec enim, quid benignitate sua intellectum velint, satis patet, nisi forte vi sanguinis prædatoriae (de qua thes. seq.) oppositum quid sit concipiendum. Et posito, succum requiri benignum, non tamen inde sequitur, esse chylum, vel chylo propinquum quid; non enim omnis benignus succus chylus est.

§ 36. Qui sanguinem, helluonis ad instar, calore suo partium substantiam alibilem exhaustire volunt, famis & febris exemplo sententiam suam stabilire conantur; sed veniam dabunt Clariss. Viri, si, quæ hoc dissuadere videntur, pauca in medium attulero. Primo, cum in fame & febris varia occurrant symptomata, quæ humorum acrimoniam demonstrant, cumque continuis in corde effervescentiis semper subtilior reddatur sanguis, nec, præter refluam a partibus lympham, quicquam ei suppeditetur, non licet concludere, sanguinem, qui naturaliter temperatus est, cui nova semper subministrantur, acrimoniam, si qua foret, lenientia, ideo depopulari partium nutrimentum, quia sanguis acrior redditus id facit. Deinde non videmus in hisce casibus solidarum partium substantiam consumi: confidunt quidem muscoli, pingvedo imminuitur, cætera notabilem jacturam non patiuntur. Quid, quod ne hæc duo quidem in tali casu semper minuantur. Vidimus inter alia, quæ ante semestre spatium in Nosocomio aperuit cadavera Clarissimus *Sylvius*, duo contraria exempla. In quodam absumpta erat pingvedo omnis, integra existente musculosa carne. In alia, quæ longo tempore decubuerat, quæ integro ante obitum mense nihil fere assumpserat alimenti, collapsi valde muscoli erant, pingvedine copiosa ubique se exhibente. Concedimus quidem, particulas emeritas (id est, quæ ab aliquo jam tempore reliquis appositæ continuo caloris appulsu magis ma-

gisque sunt attenuatæ), suppeditato per sanguinem calore, expelli: non tamen ideo absurde tribueremus eidem calori vim alias partes, nondum ita attenuatas, aut in simpliciora divulsas, in priorum locum sufficiendi, modo inter terminos cuius subjecto convenientes se continuerit, quos si transgrediatur, non mirum, quædam etiam alia expelli. Sic, quæ naturam imitatur, ars moderato calore efficit, ut hyeme flores habeat æstivos, & ova in furno excludantur; quem si auxeris, arefcet planta, indurefcet cum vitello albumen.

§ 37. Ultimo vasa difficultatem aliquam parere videntur. Arteriæ namque in glandulam hanc delatæ salivarium ramulorum numero longe sunt pauciores, &, præter hæc, venæ adfunt allato per arterias sanguini recipiendo pares; sed neutrum magnopere urget. Cum enim eadem celeritate, qua sanguis accedit, in os non influat saliva, poterit mora, quam hæc in fluxu suo trahit, illius celerius affluentis paucitatem compensare. Venas autem, quod per arterias affertur, omne non excipere, rationi valde consonum. Habent arteriæ, quod venis non communicant, habent venæ, quod ab arteriis non accipere. Illud probavit Clariss. Barthol. Spicileg. de Vaf. Lymphat. I. c. 7., ubi, *copiosius secundum naturam sanguini arterioso inesse serum*, ostendit. Hoc patet ex lymphaticis & lacteis, quæ suos in venas deponunt liquores; item ex illis senescentis carnis facibus, quas Pecquetus ostendit, *De Circulat. Sangv. & Chyl. Mot. c. 5.*, refluxo sanguini misceri, ut adeoque, quantum de arterioso sanguine illis interscipiatur, aliunde tantum restituatur.

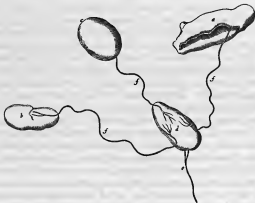
§ 38. Ex prædictis itaque facile liquet, arterias glandulis, præter calorem, etiam nutrimentum, & simul salivæ materiam suppeditare. Quod & convincunt magnæ salivationes, vel sponte subortæ, vel arte provocatæ, quæ nec a nervis nec aliunde possunt derivari.

§ 39. Alterum, quocum consentiunt, cerebrum est. Cur autem nervos inde acceperint, dubium videtur, cum necdum sensus in illis sit observatus, nec motus. Sed licet oculis motum nemo notarit, habemus tamen effecta, unde non obscure concludere liceat, inesse glandulis salivaribus aliisque motum, qui fabricæ illarum non repugnat. Unde enim, quod in os copiosior influat saliva, cum grata & delicata nobis apponuntur, si glandulæ non moverentur? A corde plus minusve sanguinis propellente non poterit expectari, alias enim non ad salivares modo, sed & ad lacrymales aliasque partes copiosior propelleretur sanguis, atque ita longe plura symptomata ob-

servarentur. Particularis itaque cum sit effectus, particularem quoque causæ universalioris determinationem requirit, ab ipsa parte petendam; cum autem effluxus ille salivæ animæ motum sequatur, facile patet, influentes per nervos spiritus animales tali modo glandularum vasa disponere, ut per lymphatica excretoria plus solito excernatur; quod antequam fieri possit, debent aliæ viæ, per quas ejus materia effluere possit, hoc est venæ, arctiores reddi. Scilicet, cum quicquid ad salivares glandulas per arterias defertur, partim in venas remeet, partim transeat in excretoria vasa, requiritur necessario, ut ab illis in hæc utriusque generis vasa viæ dentur patentes; cum autem, qui per excretoria excernitur, humor sibi similis sit & æqualiter mixtus, nec in partes heterogeneous sponte secedat, qui vero per venas revehitur, heterogeneus sit, & cessante motu in aperto aëre sibi relictus in partes heterogeneous, quas inter etiam serosa observantur, abeat: patet manifeste, meatus in salivaria tendentes tales esse, qui non nisi unius generis partes (ex pluribus tamen compositas) admittant, reliquas autem venis continuatas vias majores esse, nec certis humoribus recipiendis destinatas. Quamdiu itaque sine mora libere in venas transeat sanguis, parum materiæ salivaris excernetur; ut itaque hæc majori copia excernatur, angustiores prius reliquæ reddantur, oportet, viæ; quod nervorum ope, ut dictum, fieri, probabile est, cum ab animæ motu produci observemus. Cum itaque motum adesse non dubie pateat, licet sensus nondum sit observatus, non tamen frustra datos glandulis nervos, nisi alius, præter spiritus animales, liquor per illos moveretur, dicendum. Quid quod si & motus & sensus illis denegaretur, ipsi tamen spiritus, in illas delati, & salivæ ex Cl. Sylvi sententia juncti, dum fermentationem alimentorum promovent, satis arguunt, nervorum usum non contemnendum.

§ 40. Tertium, quocum illis commercium esse videtur, glandulæ sunt. Quamvis enim, quæ ab parotide conglomerata in appositam conglobatam feruntur, vascula adeo brevia sint, ut certi quid de illis si statuerem, illius parum memor viderer, qui, 1. *De Nat. Deor.*, temerarii esse, ait, *quod non satis explore perceptum sit & cognitum, sine ulla dubitatione defendere*; cum tamen vasa a simili maxillaribus inferioribus apposita glandula in ipsas maxillares tendentia confidero; cum vasa a conglobatis hisce in conglobatam aliam delata examino; cum ortum a communi hac glandula ductum, quæ ratione inferiora versus ad jugularis axillarisque confinium tendit, humorisque in eo

motum confidero: non omni probabilitate deftitutum me putarem, fi a falivaribus per lymphatica, mediantibus aliis glandulis, fangvini venofo qvæqvam communicari fufpicarer. Qvod ut melius pateat, fingularia qvædam vafa, qvæ in vitulino glandulas conglobatas inter ferri obfervavi, breviter delineabo.



EXPLICATIO FIGURÆ
conglobatas glandulas exhibentis.

- a. Parotis conglobata.
- b. Conglobata maxillari inferiori appofita.
- c. Conglobata alia fupra fauces fita.
- d. Communis glandula, a qua lymphaticum vas
- e. ad jugularis axillarisqve confinium tendit.
- f. Lymphatica tria a tribus diverfis glandulis,
- a. b. c., in communem d. delata.

§ 41. Cum in vitulo ante aliquot dies falivarem anteriorem examini intra glandulam conglomeratam conglobata alia oblonga fe offerret, inqvisivi in hanc, & vidi, parte anteriore convexam, pofteriore concavam efle, concavitatem vero intra innumeras fibrillas in membranam coeuntes tandem, mediantibus aliquot ramulis, in ductum colligi, qvi deorfum ferebatur in fuperficiem convexam al-

terius *conglobatæ* priori *rotundioris*, ubi in tres quatuorve ramulos diftractus ipsam glandulam ingrediebatur. Dum vero lymphæ in ramulis hiſce conſpicuæ limpideſcentiam & perſpicuitatem cum magna delectatione accuratius luſtro, video in eadem ejus convexitate ramificationi huic ſimiles alias duas, non minus diaphanas & elegantes, quarum truncos dum, quæ ferunt, ſeqvor, video alterum anteriora verſus delatum ingredi ventrem *conglobatæ* ad *maxillarem inferiorem* fitæ, aliudque a priori diverſum a *conglobata* hac in *maxillarem inferiorem* deferri, quod & Cl. *Whartonus* obſervaffe videtur: alterum vero ad interiora ſurſum tendere, quem, cum in hoc ſubjecto parum cauta manus reſecuiſſet, in alio *glandulam itidem conglobatam ſupra fauces ad finem narium* non procul a *tonſillis* ſitam ingredi obſervavi. Ab inferiore autem concava communis glandulæ parte, in cujus gibbum prædicta tria vaſa ſuis ſingula radicibus diſſeminata dixi, quarum vaſa deorſum propagabatur, quod cum in reſecto a trunco capite ulterius proſeqvi non liceret, canem aperui, ubi *glandula hæc communis* non ita rotunda, ſed oblonga, *vaſculum* ſimili modo ex interioribus procedens deorſum mittit ad cavæ in *jugularem axillaremque* divaricationem, ubi, cum aliis aliunde accedentibus lymphaticis concurrere, in cavam contenta ſua deponit. Hunc enim ad locum, quæ tum a capite colloque, tum a brachiis, ut & thoracis externis internisque partibus prodeunt, lymphatica confluunt, ita quidem, ut ex uno in alterum interdum pateat via. Quod ter quaterve mihi jam contigit: ſæpius quidem varios *jugularis venæ* exortus ramulos mihi oftendit *lymphæ* ſplendidos, & mox, agitatæ ſæpiuſcule ſanguineis vaſis, ruborem contrahentes; ad ipſam tamen inſertionem perſeqvi eos non licuit. Nuper autem, cum ductus thoracici progreſſum perſeqverer, & a vicinarum partium amplexibus liberatis, quæ lymphæ vehendæ deſtinata, vaſis in thoracicum ſtylum immitterem, in cavam viam tentans, exorbitantem ſtylum in lymphaticum, quod a capite deſcendebat, adſcendere animadverti, & quidem ad medium uſque collum, ubi pergere conantem valvula inhibuit. Inſolitus hic ab inferiori in ſuperiorem ductum tranſitus variis ſuſpicionibus anſam præbuit, de quibus ut certior evaderem, ipſam eo loco cavam a pingvedine & adhærentibus membranæ liberavi, ſimulque aquoſos, quo fieri potuit, ſtudio ductus ab invicem ſeparavi, & mox oculis manifeſte dignoſcere licuit, non modo adſcendentem thoracicum cum deſcendente colli concurrere, ſed & plurima tum a dorſo, tum

a pedibus anterioribus, una cum quibusdam a thorace (namque an omnes æque ad posteriorem partem vergant, certo affirmare non aſum, cum, præter unum item & alterum, id temporis non obſervaverim, in ipſo autem thorace notarim ante numerum ſatis ingentem) eundem ad locum vergere, & inter ſe quaſi conſpirare, a mutuo autem concurſu brevem canaliculum exſurgere, qui in gyrum ſinus atus, & digiti craſſitiem longitudine æqvans, ipſi cavæ inferitur. Cum autem idem exinde, licet aliquoties tentaverim, non tamen niſi bis terve ſucceſſerit, merito dubitare licet, anne ſita in concurſu illorum ductuum valvula vi diſrupta liberum in ſuperiora tranſitum occurrenti e diametro ſtylo conceſſerit. Tres autem illæ ſupra memoratæ glandulæ, quæ in quartam, communem nobis dictam, ſe exonerant, unde ſuum accipiant, non ita manifeſtum. Non immediate a ſanguine illas habere, certum; vidi enim, præſente Cl. Borrichio, plura lymphatica ab anterioribus procedentia ingredi tum parotidem conglobatam, tum rotundam alteram ſupra fauces ſitam; unde autem lymphatica hæc originem habeant, incertum. Ut ut ſit, a partibus exterioribus ad prædictas glandulas, ab his ad communem, & inde ad axillaris jugulariſque venæ confinium, & hinc, cum reſluo a ſuperioribus partibus ſanguine, ad cor redire lympham, experientia demonſtrat.

§ 42. Video hic reclamantem non uno nomine Nobilem Biſſium, cujus agilitatem manuum ſectio oſtendit, indolem vero ſermones & ſcripta teſtantur. Ille, omnibus Anatomicis, ut haberi poſtulat, perſpicacior, lympham, ſeu ſuccum roriferum, non modo ad ſpermaticarum partium nutritionem deferri, ait, ſed omnes in corpore humores aqueos inde deducit, atque ita ſalivam quoque a ductu chyliſero, vel, ut ille vocat, rorifero, non autem a ſanguine vult derivandam; cui de ſaliva opinioni aſſenſum præbet Clariff. Antonius Deuſſingius in *Exercitationibus Phyſico-Anatomicis de Alim. Depurat.* p. 191. Παράδοξον hoc ut probet, Biſſius primo Anatomicos ad unum omnes rejicit, hinc experimento quodam deferri in hepar roriferum ſuccum probare conatur. Primum ut obtineat, tragice ampullatur, experientiam ſuam jactat, ſecandi modum in cælum uſque attollit, cæteros tum Anatomicos, tum Practicos, Veteres ſimul & Recentiores ad unum omnes, ut artis ignaros, præ ſe contemnit, non rationes in contrarium afferendo, ſed e trivio ſumptis telis (quæ in alio ſcurrilia vocarent liberiores) ſe muniendo. Alterum ut probet, canem unico ſcalpellī ictu expedite, fateor, aperit,

hinc volante manu infignem lymphaticum ramum ex hepate prod-euntem bis terve sursum & deorsum linteo tergens comprimit, ut lateribus vasis sibi mutuo applicatis lymphæ exprimatur, mox adstantes monet, attente humoris versus hepar adscensum intueantur. Si quæras, cur ligaturis non utatur, statim audies, errare, qui hoc modo procedunt, ligaturas valere illis in locis, ubi circulari motu ex uno vase in alterum humores feruntur, ubi vero talis in orbem motus non datur, ibi nec talibus utendum, ut in roriferis vasis; contentum in illis humorem vi attractiva partium exteriorum moveri, hinc, ligato vase, commercium trahentis cum puteo, seu fonte, intercepti, atque ita cessante in totum tractione, quod ligaturam inter & fontem est, recidere, reliquum ligaturam versus relapsum tunicas in tumores sublevare. Quæ si in dubium vocaveris, reponet, se rationibus certare nolle, sufficere, quod ad oculum hæc possit demonstrare. Hæc nobilis viri argumenta sunt, quibus verum lymphæ motum se demonstrasse pro indubitato habet, adeo quidem, ut ex hoc fundamento universam hactenus Medicinam, ut errorum plenam, rejiciendam pronuntiet, novamque introducendam. Et hic ille chyli motus, quem sibi demonstrari, & in *Spicilegio Secundo*, & in *Responsione de Experimentis Anatomicis Bilfianis*, D. Bartholinus cupit; quem *Bilfius* in *Epistolica Dissertatione* adstruit; quem D. *Borrighio*, me præsentem, in vivo cane voluit demonstrare, ut mirer, D. *Deuseningium*, in chyli nomine ex *Bilfii* mente explicando occupatum, *Bartholinum* iniquæ postulationis accusare. De illo enim humore loquitur, qui in lacteis mesenterii continetur, & quem inde ex parte per lymphaticam in hepar deferri *Bilfius* demonstrandum suscepit.

§ 43. Primum quod attinet, non dubito, quin longo usu comparata in secundo agilitas multum præstare possit, & magnam illum hac in parte laudem meruisse, ultro largior; credoque, si empiria illius, cum Deæ omnibus bonis adversæ genua increret, Divinæ Sophiæ litasset, cumque convitiis plaustra, nescio unde, conveheret, rationibus se armarisset, incrementa Medicinæ multum fuisse promoturam. Quod vero tam alto supercilio reliquos omnes despicit, & ipse sibi imperium in omnes arripit, vereor, ne tragico-comicam fabula hæc catastrophem tandem sit habitura.

§ 44. In altero ejus argumento ipsum experimentum examen meretur; ratio enim, cur aliorum experimenta contrarium ostendentia, quæ per ligaturas fiunt, rejiciat, tanti non est, quod & ipse fatetur,

qvi contrarias rationes allatas, qvotcunqve uno argumento excipit, dum errantium verba esse dicat, & reclamantibus experimentum suum opponat. Aderam semel, cum in dissecto cane lymphæ motum in hepar offendere vellet, sed fateor, tanta cum celeritate hæc acta, ut nec mei, nec aliorum, qvi aderant, oculi motum illum dignoscere potuerint. Sed licet ipse non viderim, ideo tamen phænomenon negare nolo, cum non una ejus ratio possit dari. Scimus, qvam parum oculis credendum in rebus, qvæ magna cum celeritate peraguntur, licet ipsas nudas intueamur: qvanto minus hic, ubi non humoris, sed tunicæ tantum, motum videmus; compressa quidem & applicata sibi vasis latera a se invicem recedere videt, inde, prout motus hic a superiore vel inferiore parte primum observatur, humorem sursum deorsumqve ferri concludit, sed qvam valido tunc hæc nitantur, qvilibet in opticis leviter versatus facile videt: possent enim eo modo digitis solis tractari vasa, ut, licet deorsum feratur humor, tunicæ tamen ab inferiori parte inciperent a se recedere, & in tumorem elevari, adstantesqve artis ignari ascendere humorem certo affirmarent. Quid qvod tunicæ vasorum tam longo tempore cylindricæ rotunditati assuetæ, si complanentur, licet nullus adsit humor, sponte resiliant, & quidem ab illa parte incipiendo, qvæ ab ultima compressione est remota. Licet itaqve hinc pateat, in prementis potestate esse qvemlibet motum spectatoribus exhibere, nolo tamen argumentum hoc in præsens urgere. Sed largiar ei, post compressionem revera ascendere humorem, ostendamqve, posse violento motu, non obstantibus valvulis, lympham versus hepar, chylum versus glandulas lumbares, sanguinem versus glandulam colli in vasis lymphaticis propelli. Qvæ experimenta ut melius percipiuntur, ostendam, talem vasorum esse constructionem, ut cuivis patere possit, rationi non repugnare contrarium in eodem vase motum, ita tamen, ut eorum unus Naturæ sit consentaneus, alter vero non nisi ab illis, qvæ Naturam impediunt, expectandus.

§ 45. Si nullas in lymphaticis valvulas supponeremus, ut facit *Bilsius*, qvi, præter unam in thoracico ductu observabilem, nullas agnoscit, & Clarissimo *Henrico a Moinichen*, me præsentem, dixit, se scriptis suis subsignaturum, falsum se fuisse, solumqve *Moinichenium* naturam nosse, si ullæ, præter prædictam, in lymphaticis essent valvulæ: facile esset rationem dare, cur versus hepar videatur ascendere lymphæ in illo experimento; cum enim lento motu ab hepate

procedat, celeri autem agitatione, qvi in vase est, versus inferiora propellatur, ipsæ tunicæ ad naturalem rotunditatem resilientes, cum ab hepate tantum ista celeritate accipere nequeant, faciunt, ut, quod versus inferiora protrusum, ne ulterius pergat, incumbentium intestinorum pondere impeditur, sensim adscendat capacitatem vasis repleturum. Non itaque mirum, posse violento motu versus originem propelli lympham, si nullas supponamus valvulas. Sed & licet adsint valvulæ, ut revera adesse paulo post demonstrabo, poterit, illis non obstantibus, in contrarium moveri humor, si vis accefferit.

§ 46. Valvulæ cum nil sint, nisi tenuissimæ quædam membranulæ semilunares alterutri venarum lateri affixæ, patet, illas, quamdiu sunt integræ & expansæ, contrarium contenti motum impedire, si vero, vase compresso, & expresso contento, lateri, cui annexæ sunt, applicentur, officio suo non fungi; sed vase five proprio nisu, five pressi humoris vi resiliente, humorem, ut magis mobilem, facilius sursum adscendere, quam a latere venæ recedere adhærentem valvulam. Sed & vase non compresso, poterit humor, naturali progressu impedito, modo lente nec magno impetu moveatur, qua parte venam tantum contingit valvula, sensim in demortuis se insinuare, cum nullus ibi sit nexus, sed levis tantummodo contactus, qvi, distento humoris copia vase, facile tollitur. Ut de ruptura earum, de alternata extensione & relaxatione vasis nihil dicam, quibus, & forsan pluribus, modis contrarius humori motus posset comparari; sufficit mihi ostendisse, coactum lymphæ versus hepar adscensum, quem ostendit *Bilsius*, non probare, quod *Bilsius* inde concludit, quodque apud asseclas ejus tanti sit, ut super hoc fundamentum novam extrui judicent Medicinam. Quod si enim, etiam præsentibus valvulis, fontem versus humor possit propelli, modo vis quædam accedat, qvi poterit ille ex hoc experimento, quod non sine vi manifesta peragit, in vase, ubi nullas dari valvulas supponit, naturalem humoris motum concludere?

§ 47. Sed ne tantum rō posse fieri, ostendisse videar, exempla duo afferam, quibus, etiam factum esse, manifeste patebit. Cum canem gravidam statim a pastu aliquando aperirem, inveni intestina inde a pyloro undique fere elegantissimis lactearum rivulis intertexta, receptaculo exili admodum existente, ductuque thoracico parum conspicuo, & nullo lactis colore adhuc tincto; ligato itaque, cum nox instaret, thoracico ductu, repositisque in suum locum omnibus, in sequentem diem cadaver reliqui: altero mane, qvi circa intestina hæserat, chylus in res-

ceptaculum propulsus non modo thoracicum adeo distenderat, ut divaricationes ejus omnes conspici possent, sed &, cum ulterior progressus illi hac esset denegatus, ad inferiora tendens, distendensque sensim tunicas valvulas inter & opposita illis latera, quæ solo contactu junguntur, viam sibi ad glandulas ingvinales usque in sinistro latere fecerat, cum tamen vari ramuli, qui aliunde venientes lymphaticum hoc, antequam ad receptaculum pertingit, ingrediuntur, limpidissima lymphæ etiamnum tumerent, manifesto indicio lympham colore lacteo præter naturam tinctam esse: si enim ferri eo debuisset chylus, quæ causa, quod minores ramuli eo essent destituti in tanta chyli copia, quæ receptaculum ultra naturalem modum distendebat?

§ 48. Non ita pridem lymphaticum a communi colli glandula deorsum latum cum in cane investigarem, restagnante præter intentionem, ob violentam thoracis & illi annexarum partium diductionem, in jugulari sanguine, vidi lymphaticum, quæ venam attingit, rubicundam tincturam contrahere; observato itaque hujus cum jugulari consensu, ut certior de illo essem, modo jugularem premendo, modo extendendo lymphaticum, sensim plusculum sanguinis in hoc derivavi, quem, ut versus glandulam propellerem, digitis urgebam; sed cum surgentes hinc inde nodi adscendentem sanguinem remorarentur, aliam viam ingressus comprimendo prius lymphaticum, hinc iterum extendendo, atque sic, eundem laborem alternis vicibus repetendo, sensim totum vasculum rubicunda, venarum tamen respectu valde diluta, tinctura inficiebam. Tinctum ita vasculum vinculo strinxi, & mox liberata a refluxum sanguinis impredientibus jugulari, quod ultra ligaturam erat, momento pæne evanuit, reliqua vasculi parte, quæ ligaturam inter & glandulam erat, magis magisque sensim intumescante: cum itaque deorsum ad ingvinalem lac, ad communem colli sursum sanguis fuerit propulsus, quidni etiam ad hepar violento motu propelleretur lymphæ? Hoc itaque experimentum, quod semper crepat, quo omnium rationes, si Diis placet, evertit, quanti sit, quilibet facile æstimabit.

§ 49. *Bilfio* favent varii, quos inter etiam *Clariss. D. Antonius Everhardus*, qui in nupero *De Hominis Brutique Exortu* scripto p. 17. refert, se in nutritis lacte cuniculis distributionem lacteorum copiosam sursum, deorsum, ad latera, in omnes corporis partes præcipue glandulosas manifeste observasse, ipsaque lactea albedine plusquam nivea tantopere emicantia, ut omnium intuitum in se dirigerent, sanguineorumque apparentiam quasi obnubilarent. Hinc arteriis nervisque rejectis venas

lacteas substituit, per quas ad spermaticarum nutritionem chylum deferri existimat, & ad testes feminis, ad mammas lactis materiam.

§ 50. Sed licet Clariss. Vir in lymphaticis lacteum succum viderit, nondum tamen, quod maxime controversum est, motum albicantis humoris demonstravit: nisi velit, candicantem in corpore quemvis humorem chylum esse, nec talem a sanguine posse separari, quod rationi non consentire superius probavi. Et si a lacteis per glandulas & lymphatica ad partes deferretur chylus, quæ causa, quod, dum lacte nutritur, in omnibus conspiceretur lymphaticis, cum vero alia assumit alimenta, licet in lacteis mesenterii, in ductu thoracico lacteus appareat, in illis tamen, quæ nulla intercedente glandula thoracico continua sunt, vasis in aquam esset mutata adeo limpida, ut tenuissimo tantum intercedente sepimento, hinc lacteus humor appareret, illinc aqua clara & perspicua sine omni lactis tinctura? Patet hoc in experimento thes. 35. allato, & vidi aliud ejus rei indicium satis manifestum. Gravidam canem vivam aliquando in præsentia Clariss. Borrichii aliorumque amicorum aperueram, ubi, postquam varie huc illuc intestina agitassem, aliud quærendo, vidi lymphaticum pennæ anserinæ mediocris crassitiem æquans, quæ receptaculum spectabat, lacte turgere, cum reliquum inferiora versus lymphæ esset repletum. Jucundum erat videre lac lymphamque se mutuo quasi contingere, nec tamen confundi, alterum enim ab altera non nisi sigmoidea quadam linea discernebatur, ultra quam lac propellere non licebat, cum tamen repelli facillimo negotio posset; manifestum itaque valvulæ præsentis argumentum erat sigmoideum inter diversis coloris humores interstitium: nec enim quicquam vel fingere possum, quod in limpida aquam mutasset chylum, aut chyli progressum versus inferiora in tali casu potuisset remorari. Quid quod posito, quem Everhardus vult, nutriti succi motu, quæ omnibus primo alimenta præparant, intestina alimento destituerentur, si spermaticas nutrienda materia non nisi a lacteis esset expectanda: nisi forte, præter lacteas succum ab intestinis deferentes ad receptaculum, aliæ a receptaculo intestina versus tendentes essent concipiendæ. Certe tot experimenta motum lymphæ a circumferentia introrsum comprobantia, quæ & a variis in arte anatomica exercitatissimis viris facta partim vidi, & ipse utcumque imitando tentavi, fortiora mihi videntur, quam quæ tam levi argumento a solo colore petito debeant postponi. Existimarem potius, refluam a partibus lympham in teneris

oribus & lacte solo nutritis animalibus tenuioris chyli portiunculam in corde tantillum coctam secum vehere, maxime cum voraces adeo sint cuniculi, ubi magis mirarer, totum sanguinem non albicare, quādoquidem ita se lacte replent, ut quorundam ilia ipso teste rumpantur.

§ 51. Qvod vero chylifera, quæ ad mammas idem Celeberrimus Vir deducit, attinet (unde sequeretur, nec omne, quod in chyli receptaculo est, in cavam adscendere, nec, qui in corpore reperiuntur, humores utiles a sanguine omnes derivandos), cum eandem sententiam & varii ante Doctissimi Viri arripuerint, & ipse Clariss. *Everhardus* propria confirmet experientia, argumentis illam a sola ratione petitis impugnare velle, a temeritate parum abesset. Pag. enim 282. profitetur, se observasse in cuniculo, femina sc., quæ & prægnans esset, & simul lactaret, vasa chylifera, seu lactea, excurrentia supra musculos abdominis super pinguedinem, seque in glandulosam mammarum substantiam insinuantia, quæ postmodum conjunctim tubulos aliquos lacteos, ac tandem canalem communem constituerent, sicque lac per papillam exhauriendum præberent. Licet autem hæc semel tantummodo, ut ex verbis ejus liquet, observaverit Celeberrimus Vir, adeoque varia, quæ experimentorum requisita suppeditant, hic movere liceret, mittam nihilo minus illa, &, quid simili in negotio mihi contigerit, paucis exponam. Namque & ego in cane paucis a partu diebus, cum etiamnum utero adhærerent carnosus annuli placentæ vice fungentes, & numerosæ prolis indices, in Clariss. *Borrichii* aliorumque amicorum præsentia tentavi. Integrum *συχθήμερον* a catulis seclusa tantam lactis vim collegerat, ut mire auctus uberum tumor vix levem contactum sine copiosa lactis profusione ferret. Ideoque de uberiore lacteorum cognitione spem concipiens lenta manu & suspensa sectionem aggredior. Mox, cute vix separata, observo rivulos innumeros lacte admodum turgentes, quibusdam quoque in locis adeo dilatatos, ut peculiaria ibi receptacula formata credidisses, ex innumeris radicibus per glandulosam crustam disseminatis oriri, qui immissum styllum, per aperta papillarum foramina, quo convergebant omnes, illico emisere. Cum itaque, illos saltem lactis canales e mammarum glandulis originem ducere, manifestissime pateret, ulterius progressus nivei laticis materiam mammis advehentia vasa duxi investiganda. Qvod ut felicius succederet, ubera a substratis musculis sensim separavi, a lateribus medius versus pergendo, ratus fore, ut, si quæ lactea ab interioribus prodirent, oculis se tandem nostris sisterent, cum & tantus in uberibus lactis

esset proventus, & animal convenienti tempore pastum. Sed tandem spe frustratus, præter sanguinea vasa magna & innumera, paucosque & exiles in inguinum regione sitos lymphæ ductus, lactis vel in uberibus, vel in receptaculo reperti alborem omnino non referentes, nihil inveni. Ex hoc itaque experimento licet varia colligere liceret, cum tamen semel tantum factum, plura vero ad certam sententiæ alicujus confirmationem requirantur, silentio illa involvam.

§ 52. Cum itaque nec *Bilfi* experimentum, nec *Everhardi* contrario lymphæ motui demonstrando sufficiant, reliquum est, ut receptam communiter sententiam etiam in lymphaticis colli locum habere ostendam, quod vasorum in glandulis distributio probat, valvularum in vasis situs demonstrat.

§ 53. Communem si examinare libet glandulam, videbis a superiori bus glandulis descendente vasa non in unum truncum coire, sed singula seorsim, dum in via sunt indivisa, ubi ad convexitatem ejus devenerint, in plures ramulos distracta oculis se tandem subducere. Quod si ab hac fursum aliquid efferrent, cur, quod in cæteris partibus fieri videmus, in unum primo truncum non concurrerent? Sin valvulas consulere animus, observabis fursum actum humorem variis in locis elevata in nodos vasorum tunica ab ulteriori progressu impediri, ut thes. 47. exposui.

§ 54. Sed manifestius valvularum indicium in bubulo hoc modo inveni. Vasculum, quod a rotunda maxillari internæ apposita ad communem nobis dictam defertur, duobus in locis aperui, primo prope communem glandulam, qua immixtus, & fursum actus, stylus offendiculum statim reperiēbat; hinc in superioris vicinia, unde deorsum protrusus libere ad inferius foramen usque permeabat, inde, hoc retracto, priori fursum viam secundo tentans, idem, quod prius, obstaculum offendebam, atque ita, ter quaterve stylos alternatim modo fursum, modo deorsum agendo, semper hæere inferiorem, altero per idem obstaculum transeunte, observabam. Quod si itaque alia rorifera vasa *Bilfius* non observaverit: nec lymphæ ad exteriora motum, nec salivæ materiam inde derivandam demonstrabit.

§ 55. Concludo itaque, secretum in stomaticis glandulis ab arterioso sanguine humorem, & in os per lymphatica excretoria spirituum animalium in glandulas & musculos adjacentes influentium ope expulsum, salivam constituere, rotundas vero, seu conglobatas, quæ in priorum vicinia reperiuntur, acceptam ab exterioribus partibus lympham in venas refundere, ut refluxo ad cor sanguini misceatur.

COROLLARIA

I

1. *Varium sanguinis in animi affectibus motum, mutatamque in sanguine humorum proportionem per venæ cavæ motum explicari posse, suspicamur.*

2. *Namque venam cavam quibusdam in locis moveri, partim sensui patet, partim rationi.*

3. *Sensui manifestum, carnosam ejus prope cor portionem pulsare.*

4. *Rationi consentaneum, ab extremis venarum incipere motum, cujus ope versus cor impellatur sanguis.*

5. *Prout itaque extrema variis in partibus magis minusve arctantur, hinc & in illis partibus secernendi humores majori copia vel excernuntur, vel per venas in cor refunduntur.*

6. *Sic & carnosæ cavæ portio non tantum plus minusve sanguinis cordi subministrare, sed & sanguinis adscendentis (quem in iratis ad minimum biliosum agnoscunt fere omnes) ad descendentem (lymphæ, interdum & chylo mixtum) proportionem mutare poterit.*

7. *Hinc, quæ in ira, tristitia, gaudio aliisque mentis perturbationibus observantur, symptomata commode explicare licebit.*

II

1. *Glandulas pro catarrhorum fontibus haberi posse, non absurdum putamus.*

2. *Necdum enim, quas a cerebro deducunt, viæ satis sunt detectæ.*

3. *Nec, quæ Clar. Schneiderus de arteriis membranisque pituitariis proponit, rem totam explicant.*

4. *Nam præter vasa materiam secernendam advehentia, præter locum, in quem secreta effundatur, alius, in quo secernatur, adducendus, pro quo glandulas habemus. Quas ut in aliis sic & in illis, quos Clar. Schneiderus recenset, fontibus ostendere licet.*

III

1. *Tale colaturæ genus in corpore dari, qvo, subtiliore retento, crassius percoletur, rationi repugnat.*

2. *Nec quicquam proficiunt, qvi contrariam sententiam mucii exemplo defendere nituntur.*

3. *Licet enim excretus jam mucus sanguine crassior appareat, dum tamen excernitur, sanguine crassiozem esse, negamus.*

4. *Multo minus efficiunt, qvi animam hominis, quam in sanguine collocant, prout commodum illi visum, hæc excernere, illa retinere statuunt.*

5. *Namque ut animæ vim magnam esse concedo, ita, humores ab illa immediate aliquid pati, non mihi persuadeo.*

IV

Aquam falsam colatura dulcem fieri, licet multi affirmant, nos in præsens negabimus.





VARIÆ IN OCULIS & NASO
OBSERVATIONES NOVÆ &C.





VARIAE IN OCULIS & NASO
OBSERVATIONES NOVAE &c.





THOMÆ BARTHOLINO

HAFNIAM

QUOD ad intermissum diu officium adeo lentus redeam, partim itineri debetur, partim valetudini amicorum admodum imbecilli. Namque & nobiliorum in vicinis provinciis urbium lustratio multum temporis sibi vindicavit, & ex itinere nobiscum ægrum Leidam reduximus *Hasebardum*; Amstelodami autem *Walgesteinium* graviter decumbentem offendimus; alternis itaque modo hunc Amstelodami, modo illum Lugduni visitando rebus nostris pro lubitu vacare non potuimus. Uterque autem jam convaluit, *Hasebardus Borrichii*, *Walgesteinus Burrhi* auxilio. Cum in itinere essemus, pro ipso, quem frustra quærebam, *Deusingio Vindicias* illius Groningæ reperi, quibus, licet mea impugnet verba, ipsum tamen Dominum *van Horne* aggreditur, & in illum omnem suam bilem evomit. Valde autem acuti sensus sit, oportet, qui tam levem attentum ferre nequit. Dixi, eum *Bilfio* favere; dixi, in opinione de salivæ in glandulis secretæ origine *Bilfio* assensum præbere; dixi, mirari me, quod in chyli voce ex *Bilfi* mente explicanda occupatus iniquæ postulationis *Bartholinum* accuset; nec de eo præterea quicquam. Hæc verba adeo moverunt eum, ac si vel gravissima dixissem. Inter alia, in controversia, quam tibi movit, mire se torquet, & quæ aliorum respectu a te dicta solitarie fumendo, statum controversiæ te inter & *Bilfium* de chyli per mesaraicas rubras motu esse defendit. Sed videtur occasionem *Exsequiarum Hepatis* aut ignorare aut reticere, & præterea admodum volante oculo *Spicilegium* tuum pervolvisse. Namque & verus lymphæ a te primum observatus motus de throno

hepar dejecit, & ipse in *Spicilegio Secundo*, ubi de lymphæ motu Bilfiano agis, in hoc cardine observationum tuarum salutem versari ais, & rogas, ut fidem suam brevi exsolvat. Sed his non consideratis in chyli interpretatione Bilfiana hærens *Deusingius*, ut chyli motum e lacteis in hepar demonstret *Bilfius*, iniqua te conditione postulare dicit, ac si *Bilfius* hoc non promississet; cum tamen in *Epistolica Dissertatione* dicat, contentum in lacteis succum partim in hepar ferri, partim in thoracicum ductum, seqve illud ad oculum demonstraturum polliceatur. Sed hæc & cætera in *Responsione ad Vindicias* ejus fusius diducta videbis, quam una cum *Disputationibus* & adjuncto illis *De Oculorum Glandulis Tractatu* brevi, favente Deo, habebis; habuisses jamdudum, nisi varia etiam præter ante memorata impedimenta moram mihi injecissent. Dum autem hic occupatus sectiones interdum ad partes voco, quædam non ante visa mihi se offerunt. Nam præter varia salivæ vasa & illa lacrymalia in glandula oculi externa jam ante observata etiam in lacrymali caruncula duo ejusdem generis vasa observavi, ad cartilaginis latera utrinque unum, quæ stylum nullo negotio admittunt. De punctorum lacrymalium continuatione admodum manifesta nihil addam, cum eam tibi a *Clariss. Borrichio* jam ante significatam existimem, & brevi cum *Tractatu de Glandulis Oculorum* de illa plura sis visurus. De alio vero excretorio vase, quod in narium tunica non ita pridem observavi, dubia quædam occurrunt, de quibus a te informari optarem. Cum enim in ovillo, punctorum lacrymalium continuationem accuratius examinaturus, narium ossa effringerem, vidi, remotis ossibus, in narium tunica vasculum lymphaticorum instar splendens anteriora versus decurrere, ideoque pro lymphatico reductorio habere cœpi. Cum vero, naribus sectione apertis, supra manifestum continuati punctis lacrymalibus meatus egressum, foveam vel sulcum angustum & nigricantem, per quem in prædictum vas viam seta patentem invenit, notarem, & accuratius locum, ultra quem seta penetrare non valuit, inspicerem, patuit ex radicibus, quas ibi agit, manifestis, lymphaticum excretorium esse. Mirum autem, in tunica non crassa a minutulis istis glandularum portionibus tam elegans prodire. Sed magis miror, quo fine humor ibi secretus ad narium extrema deducatur, cum ostium ejus vix ad digiti latitudinem inde sit remotum. Dicerem, excrementitium esse, sed videmus in aliis corporis nostri partibus excretum per ejusmodi vasa humorem certo

ufui destinatum, nec plane excrementitium esse, hic autem, cum vix extra canalem suum sit, quin simul sit extra corpus, non video, cui ufui possit esse, ideoque nec nomen illi invenio. Qvod si itaque tuam mihi hac de re sententiam communicare dignatus fueris, magno tua in me merita cumulo augebis.

Præter hæc etiam *Bilfi* experimentum de motu chyli, cum Amstelodami essem, imitatus sum; sed illam in sanguine diversitatem non inveni, licet ad tertiam horam in vivis detinuisssem canem, qui vel integrum diem in hoc tormento vixisset: sed cum unica vice tentasse non sufficiat ad certi quid concludendum, prima occasione idem saxum volvam, licet fatear, me tam longis cruciatibus non sine horrore illos torquere. De Philosophiæ certitudine multum gloriantur Cartesiani: vellem, ita certo mihi pervaderent, ac ipsi sunt pervasi, nullam esse brutis animam, nec differre, utrum bruti vivi nervos an automati, qvod actu movetur, chordas tangas, disseces, uras; vivi enim animalis viscera & vasa aliquot horis sæpius & libentius rimarer, cum multa videam inqvirenda, quæ alia ratione non licet exspectare. Vidi alias etiam in eodem subjecto thoracicum ductum descendenti a colli glandulis lymphatico continuum esse (stylus enim per illum immissus ad medium fere hujus adscendebat, ulteriorem progressum impediende valvula) nec in axillarem immediate se exonerare, sed in utriusque ductus concursu (qvo etiam plura alia confluant) alium formari canaliculum, qui in gyrum sinuatus circa axillaris jugularisque confinium se in sanguinem exonerat. Per hunc ex venis tum in thoracicum ductum, tum in lymphatica reliqua sanguinem varie vasa illa agitando tandem vi quadam coegi refluere, ut ea de re certior essem. Sæpius ante stylo in axillarem per thoracicum viam in canibus frustra affectavi, nec unquam distincte adeo ac tum temporis progressum ejus continuare valui. An sæpius & certa quadam via eadem observare licebit, proxima occasione, si Deo placuerit, videbo.

Bilfius etiamnum filet, nec scio, utrum feriæ caniculares a male dicendo vacationem illi concesserint, an in perpetuum ab illo opere sit feriaturus.

Qvod publica spectat, nihil in præsens scribenti se offert, nisi qvod febres hic plurimos invadant, quorum multi non tam morbi quam propria culpa succumbunt. Necdum enim ulla malignitas observata, nec ullæ conspectæ maculæ; Amstelodami tamen quam

hic magis sæviunt, & retulit mihi ante paucos dies Clariss. *Golius*, sibi a Medico quodam Amstelodamensi per litteras relatum, una & eadem nocte plus quam centum homines febris correptos sine tamen ullis gravioribus symptomatibus. Sed nimis forsan te detineo, Clarissime Vir, quare hic abrumpo, & te cum tota familia tua valere jubeo, quam humanissime rogans, tuo me amore & patrocinio fovere pergas, & quas festinans manus declinare non potuit, maculis irasci parcas.

Dab. *Lugd. Bat.* Anno 1661. 12. Sept.

Clariss. *Borrichius* Te Tuosque
quam officiosissime salutat.

T.

Obsequent. Discip.

NICOLAUS STENONIS



RESPONSIO AD
VINDICIAS HEPATIS REDIVIVI





RESEARCH AND
DEVELOPMENT





Viro Clarissimo & Experientissimo,
DN. ANTONIO DEUSINGIO,
Med. D. & Profess. Celeberrimo,

NICOLAUS STENONIS
S. P. D.

QUOD & meas examini tuo disputationes subjicere libuerit, Clariss. Vir, gratum mihi fuit, gratius futurum, si, quibus indies distraheris, occupationes tantillum temporis adhuc reliquum tibi fecissent, donec eorum, de quibus agitur, mentem, meamque plenius percepisses. Ab aliis didici, praxin tibi tuam multum temporis eripere; ex scriptis vero, quæ luci quotidie exponuntur, te variis tum legendis, tum scribendis occupari abunde liquet: omnibus autem manifestum est, defatigatum aliis curis & laboribus animum quibusdam in negotiis minus observari Lynceum, aciemque ejus vel acutissimam non interrupta variorum speculatione hebetari. Uno unum duntaxat tempore distincte percipiunt oculi, ubi autem sine intermissione varia simul attente lustrarunt, etiam in Sole non raro caligant. Non dubito itaque, quin, si otium tuum majorem in meis pervolvendis attentionem tibi permisisset, tum illæ, quæ nuper prodire, *Vindiciæ* prodissent nunquam, tum alia, quæ veritati indagandæ magis inservirent, vel experimenta, vel argumenta fuissent allata. Non enim res ipsas in *Vindiciis* aggrederis, nec contenti in lacteis succi per lymphatica ad glandulas oris motum defendis: sed hæc silentio involvendo ad verba verborumque sensum descendis, & nos boni interpretis munere non functos magno conatu ostendere

laboras. Licet autem verborum hoc examen, si nude inspiciatur, tam parvi sit ponderis, ut quod illi impenditur tempus, sine fructu periisse dicendum sit, cum tamen placuerit tibi tantos in simpuvio fluctus movere, & non tam in me, quam in Clarissimum *Johannem van Horne*, qui extra omnem culpam est, adeo acriter invehi, cogit me tum, qui Præceptor debetur, affectus, tum, quem sibi quisque debet, honesti nominis amor, rem totam planius exponere & ostendere, nec Clarissimum *Præsidem*, nec me talem meruisse censuram.

Cum non modo in dedicatione me thesium authorem professus sim, sed & in ipsis thesibus, ut 4. 13. 14. 15. 32. aliisque, manifesta posuerim indicia, unde Clarissimo *Præsidi* eas non adscribendas esse cuiusvis liquere potest; non video, quid tibi svaserit ea uti inscriptione: *Vindiciæ Hepatis Redivivi Leni Correctione Tangentes Seqviorum Interpretationem Clarissimi D. Johannis van Horne*. Quid enim aliud ea innuit, quam quod & singulis dein pagellis confirmas, te nulla habita prædictorum consideratione omnia D. *Præsidi* attribuere? Ne credas, Clarissime Vir, me laudis adeo cupidum, ut aliorum labores pro meis venditarem, meque disputationis non defensorem modo, sed & authorem profiterer, quæ ab alio esset conscripta. Aliorum exemplo didici mendicatos titulos spernere, & si aliud nihil, vel sola Horatiana cornicula me docuit, quid sit furtivis coloribus splendere. Mea autem esse experimenta, & meas, quæ proponuntur, observationes, eorum, qui semper fere secanti mihi adfuerunt, testimonio probare licet, ut Clariss. *Olai Borrichii*, Prof. Reg. Hass., *Christiani Rudnicii*, *Butovio-Prussi* Med. Doctor., *Matthiæ Jacobi Matthiadis*, Med. Studiosi. Quid quod & Professores hujus loci Celeberrimos D. *Sylvium* & D. *van Horne* testes producere possum, quibus non displicuit mea interdum tyrocinia inspicere. Sed nec Clariss. *Goliuss*, *Mathematicum* & *Orient. Ling. Profess.*, Præceptor colendus, cum salivæ & lacrymarum vasa in bubulo adornarem, spectatorem agere dedignatus est. Quid si itaque hominis tibi ignoti verbis fidem non adhibes, his saltem viris crede, & mihi, si quæ habes, objice, nec *Præsidi*, cui ob publicas occupationes alias vix tantum otii tum fuit, ut semel eas resolveret, quæ mihi imputanda, vitio verte; aut si præscriptam *Vindiciarum* p. 31. legem urges: erraverim ego, præsidio contenta probaverit *Præses*, non tamen ideo errores ipsi tanquam auctori omnino adscribendi, non in fronte operis omnium oculis nomen ejus exponendum. Doleo sane, Clariss. Virum pro

præstito mihi beneficio talia reportare, illi *sequiorem interpretationem* objici, contra illum in medium præferri, quæ facere possunt ad *eruditos inter se committendos*, illi *inconstantiam, oscitantiam, imprudentiam, animum non satis serenum, nec ab affectibus vacuum, &c.* objectari. Doleo, inquam, de illo talia narrari, cum nec ipse quicquam commiserit, nec in thesibus, quæ Clariss. Vir tantopere urget, proponantur. Præcipua enim controversia de venis mesaraicis, quo nomine maxime in Dominum *van Horne* inveheris, adeo a disputationibus meis aliena est, ut salva thesium veritate & cum *Præfide*, & tecum, & cum *Bilfio* amice consentire possem, si ipsa consentiret veritas. Ego enim de lymphaticis tantum ago, & ostendo, *Bilfianam* de illis opinionem veritati minus consonam, unde hoc tantum sequitur: *Nihil ab intestinis per lacteas & lymphaticas ad hepar fertur; vestra autem est sententia: Chylus per mesaraicas sanguineas fertur ad hepar; quæ hic pugna?* Nego, chylum ab intestinis ferri ad hepar per lacteas, ideone etiam nego, illum ferri per sanguineas? Non itur hac via, ergo nec illa? Nullam hic invenio contradictionem, nec ulla ratione video, quibus argumentis ex disputatione mea desumptis motus Clariss. *Præfidem inconstantiam* arguas; dicas, cum *videri in utrumque latus claudicare, cogaris profiteri, te mirari, novos in re plana ipsum hepar concernente conatus institui ab illo &c.* Quem ego statuo, lymphæ motum a lymphaticorum inventionem defendit Clariss. *van Horne*, quem ille chyli per mesaraicas sanguineas motum, ut probabilem tuetur, ego ne verbulo tango; quæ igitur hic inconstantia? Quæ occasio ista de venis mesaraicis movendi? Quæ ratio talia proferendi, unde *videri possis*, ut p. 5. fateris, *velle viros eruditos inter se committere, vel discordiæ semina spargere inter eos, quos non ignorabas amicos?* Quod si vel gravissima in te dixissem, sanctiora tamen inter illos amicitiae jura tibi essent, quam ut talia proferres. Quod autem chyli per mesaraicas sanguineas in hepar motum attinet, licet de eo in thesibus nihil dixerim, cum tamen hic illam movere controversiam tibi libuerit, paucis dicam, me necdum vel rationem, vel experientiam vidisse satis urgentem pro illo adferri; sed nec perspicere, cur *Vindiciarum* p. 26. ita loquaris: *Rationi namque soli hic fidere non possum secus atque in motu chyli ad hepar per mesaraicas rubras.* Quod si enim rationi tantum tribuis, ut in motu chyli ad hepar illi soli fidas, quidni etiam in motu lymphæ eandem illi potestatem concedis? Si autem hic aliorum

experimenta exspectas, quis tibi promisit, experimenta illi opinioni contraria cum tempore non posse ostendi? Absolutum nimis imperium rationi permittis in re, quæ post detecta lactea plures invenit adversarios quam patronos. Quid quod & contrariam rationi tuæ experientiam jam exhibuerit Celeberr. Pecquetus in *Nova de Thoracis Lacteis Differt.*, Experiment. 1., quod si ipse fuisses imitatus, tam audacter soli rationi dictaturam non detulisses. Melius Hippocrates, qui initio *Præception.*, ubi de ratiocinatione egit, tandem subiungit: Περί μὲν οὖν τούτων ἄλις ἔστω διειλεγμένα. τῶν δ' ὥς λόγου μόνου ὑμπεραινομένων μὴ εἴη ἐπαύρασθαι, τῶν δὲ ὥς ἔργου ἐνδείξιος. Sed magis adhuc miror, quod *Bilsi* de mesaraicarum usu experimento tantum tribuas, ut contra Cl. *Bartholinum* suscipias defendenda, quæ nunquam nec tentasti ipse, nec ab aliis vidisti tentata. Disputas de colore rei, quam te non videri disse affirmas, & quem alii *very swart* appellant, parum tantum nigricantem interpretaris. Sed certus sum, te, ubi illa expertus fueris, longe alia mente futurum. Feci experimentum in amicorum præsentia, observavi præscriptam a *Bilso* methodum, ligavi arterias, detinui in vivis canem primum per tres, alterum per quatuor horas, qui vel integrum diem ita vixisset; confutum dein ventrem iterum dissecui, eductum ex porta, cava, aorta sanguinem aëri exposui, sed æque cito concredebant, splendebant æque, æque nigricabant. Quid igitur inde concludis? Sed & ratio *Bilsi*, quæ probat, contentum in portæ ramis succum cum sanguinis natura affinitatem habere, gratis assertur, cum non modo hoc largiamur, sed & esse ipsum sanguinem ultro concedamus; nihil itaque illa ratione agit. Nec, quæ de colore denso, subobscurò, obscuro, cinericeo infert, quicquam probant; examina, quæso, eductum venæ sectione sanguinem, & vide, quam varios in variis subjectis observare liceat colores. Sed hæc mitto.

Cum itaque pateat, nec *Præsidis* esse, quorum nomine leni illum correctione tangere voluisti, tetigisti autem acriter, nec ullo jure, quæ de chyli per mesaraicas rubras motu affers, hic locum habere: oportet, ut omnia, quibus eum perstrinxisti, in me transferam, & dicam, mutato nomine de me omnia narrari. Sed nec me, quæ objicis, meruisse, ostendere mox aggrediar, ubi in antecessum monuero, me omnia, quæ affectibus tuis, non forsân tibi ipsi, deberi, æquus lector judicabit, qualia sunt oscitantia, imprudentia, oculi distorti, obliquus intuitus, iniqua disputatio, & quæ cætera vel absolute, vel sub cons

ditione posita, hæc inquam, omnia transiture, & ipsa rerum momenta candide expositure; quid enim ejusmodi verbis efficitur, quam ut magis magisque commoveantur animi, atque ita res ipsa non ea, quæ decet, attentione examinetur? Ægre ferrem, si in thesibus vel unicum verbum de te posuisses a commoto animo profectum: sed nec de *Bilfio* aliud dixi, quam quod ipse, si cum eo fueris locutus, non negares; idcirco dixi, indolem ejus ex sermonibus & scriptis dignoscendam, quid autem sunt hæc ad illa, quibus adeo acerbe sine omni ratione *Barthol.*, Præceptorem meum, agressus est? Quod vero, quæ ego *Bilfio*, tu tibi attribuis, quo jure id agas, non video. Non dixi, te omnibus illius favere, sed quibusdam, & quis vitio mihi verteret, si ego in re, quæ vera, assensum præberem homini vel omnium hominum perditissimo, ideone etiam ego ejusdem farinae essem censendus? Ne putes, *Clariss.* Vir, quenquam æquum rerum arbitrum (de aliis non loquor, cum etiam optime dicta pessime liceat interpretari) illum, quo *Bilfium* prosequeris, favorem adeo late extensurum, ut etiam *Bilfii* vitia tibi sit adscripturus. Sed & irasci mihi parce, qui de te nihil dixi, nisi quod ex scriptis tuis cuilibet est manifestum. Dixi thes. 25: *Nobil.* *Bilfius* & *Bilfio favens* *Clar. Anton. Deusing.*; thes. vero 42: *cui de saliva opinioni assensum præbet* *Clar. Ant. Deusing.* Quid in his verbis tali censura dignum? Quæ hic causa tales fingendi suspiciones? Quod si ipse te *Bilfio* favere dicas, si partes ejus, in quantum tibi videntur veræ, contra adversarios fuscipis defendendas, quid in me excandescis, quod, quæ ipse profiteris, ego dicam? Nimis arctas scribendi leges nobis figis, si, ubi de re agitur, authores testes adducere non permittis: qui p. 30. ais: *Quid misceor personis, ubi de rebus agendum?* Quid si ad hanc legem tua examinarentur? Sed quantum video, in eo erravi, quod dicendum fuisset, non te *Bilfio*, sed illum tibi assensum præbere, ut p. 28. liquet: *Quamvis certe hic potius, ubi vere consentimus, sentiat nobiscum, nostrasque sententias passim, etiam ante Bilfii nomen eruditis cognitum, publice expositas, videatur suis experimentis confirmare;* quasi vero etiam de eo certandum esset, uter dicendus alteri assensum præbere, nec utrique æque convenire posset. Fac, te mentis oculis illa primum vidisse, *Bilfium* autem oculis corporis eadem primum observasse, nonne eodem jure experimentis ejus assensum præbere diceris, quo tuis ille rationibus? Notum omnibus, *Bilfium* tua nunquam legisse, sed & te, quæ ejus

funt, nunquam vidisse, affirmas: quid igitur refert, uter alteri assensum præbere dicatur, maxime cum & tua ratio & ejus experientia in illo casu ejusdem sint ponderis?

Sed mittam hæc, & eo pergam, ubi verba & sensum detorxisse dicor, ostendamque, me *Bartholini* tuamque & *Bilsi* mentem percipisse, nec aliter ac est proposuisse; quod ut fiat, meum prius exponam, necesse est, sensum, simulque dictorum occasionem.

Boni enim interpretis est, non ipsa modo verba seorsum considerare, sed & cum antecedentibus simul & consequentibus conferre. Præstat enim, ubi de re agitur, sensum auctoris integrum, quam ipsa ejus verba proferre, nisi &, quæ occasione eadem verba fuerint prolata, ubi opus, subjungatur. P. 31. ais: *Vir candidus ipsa aliorum verba proferat, quos vult laudare, vel repudiare (sic ago cum aliis, dum veritatem inquiri) vel saltem non detorqueat & verba & sensum, nec dubiis locutionibus præjudicia creet.* Videamus itaque, uter nostrum magis candide egerit, tu ne, qui ipsa aliorum verba profers, an ego, qui eorundem sensum. P. 19., ut probes, *Bartholinum* iniqua conditione a *Bilsi* flagitare demonstrationem motus chyli e lacteis ad hepar, ipsa *Bartholini* verba ex *Spicileg.* 2. adducis, ubi ipse statum quæstionis determinat; de motu chyli per mesaraicas ad hepar, quem negat, hinc p. seq. ita infers: *Quod si autem iste sit status controversiæ, exponente ac confitente ipsomet Bartholino, quid poscit a Bilsi, ut demonstret sibi ingressum chyli in hepar per lacteas venas, quo ad resurrectionem hepatis aditus pateat, seu sanguificationis munus eidem asseratur? An non iniqua conditio est, dum Bilsius promittit, se demonstraturum chyli immediatum ex ventriculo seu intestinis in hepar ingressum per mesaraicas rubras (quem pernegat Bartholinus) ab ipso postulare, ut demonstret chyli in hepar ingressum per lacteas: quem motum chylo, seu succo nutritio, de quo solo quæstio est (non de lymphæ seu rore), ipsa negat natura iudice Bilsi? An scopum ferire illa conditio censenda, sub qua demum assensus resurrectioni hepatis haud difficilis promittitur? Quis lectorum, qui Bartholini *Spicilegia* non evoluit, hisce tuis verbis fidem non adhibebit, & credet, Bartholinum sibi ipsi contrarium, vel sui oblitum in *Spicileg.* 2. talem controversiæ statum formasse, in *Responsione* autem longe alia postulare? Qui vero ipsum *Spicilegium* inspexerit, qui viderit, Bartholinum duo sibi sumere refutanda, &, in prioris examine occupatum, dum videt, ex primo experimento concludi*

id, de quo non quæritur, dicere: & quanquam chylum sanguini commixtum cum aliis largiremur, id tamen hoc loco non quæritur. Quæstio est, an succus ille nutritius, chylus dictus, ex ventriculo cor primum petat &c.; hoc vero refutato alterum membrum aggredi, & de lymphæ motu varia, quæ suo loco afferemus, proponere: videbit facile, statum controversiæ in primo membro formatum longe diversum esse ab eo, de quo in secundo agitur, nec ad illa de lymphâ reducendum. Quod si itaque verba tua secundum veri interpretis leges forent supplenda, talia essent. Quod si autem, ubi de mesaraicarum rubrarum usu cum *Bilfio* disputat *Bartholinus*, iste sit status controversiæ, exponente & confitente ipsomet *Bartholino*, quid, cum de lactearum & lymphaticorum usu agitur, poscit a *Bilfio*, ut demonstret sibi ingressum chyli in hepar per lacteas, quo ad resurrectionem hepatis aditus pateat, & sanguificationis munus eidem asseratur? Atque ita videbit quilibet, qui *Epistolicam Bilfii Dissertationem* legit, qui occasionem *Exsequiarum Hepatis* novit, æquane an iniqua sit illa conditio, quam *Bilfio* proponit *Bartholinus*, de qua infra pluribus. Sed & simul observabit, qua fide *Bartholini* verba fuerint adducta, & an semper tutum sit credere illis, qui, quæ de aliis proferunt, ipsis illorum verbis probant. Multa enim aliorum respectu vera sunt, quæ per se posita sunt falsissima, sic respectu primi membri a *Bartholino* in *Spicileg.* 2. refutati verum est, hunc esse statum controversiæ, si vero absolute sumas, nequaquam verum. Ut enim duo præter communem opinionem asserit *Bilfius*, sic & duo diversi sunt status controversiæ, & dum hoc loco hunc esse statum controversiæ dicit, non negat alio loco alium esse. Invitus hanc de interpretis munere controversiam moveo, quam silentio involvissem, nisi tuæ illam *Vindiciæ*, quasi vi, mihi extorquissent. Ut enim ostendas, me sinistre interpretatum tua verba, verba tua in alienum sensum detorxisse, &c., ipsa verba *Bartholini*, *Bilfii*, tua, mea profer, atque ita apud lectores, qui qua occasione singula fuerint dicta, ignorant, fidem statim invenis; ut itaque illud a me crimen removerem, prius modus, quo in me uteris accusando, erat examinandus. Jam autem in thesibus a me proposita aggrediamur, & videamus, egone tua verba in alienum sensum detorserim, an tu potius mea minime fueris assequutus.

Cum *Disputatione de Glandulis Oris* & nuper *Observatis inde Prodeuntibus Vasis Prima* historice omnia proposuissem, reliquum erat,

ut & de usu quædam subnecterem; hinc *secundam* addidi, ubi statim in initio, quod ex observatis sponte fluebat, proposui, *glandularum munus esse eum, qui in ore perpetuo reperitur, humorem præparare*; adjunxi etiam exempla, ut ostenderem, ad alias vias salivam in os immediate deponentes non recurrendum. Jam restabat quærendum, unde mediate saliva esset deducenda, quod maxime dubium; a glandulis enim in os prodire ad oculum demonstrare licet, unde autem oriatur ille in glandulis præparatus humor & orarigans, non item. Poterit enim a cerebro derivari, & quidem vel per nervos, vel alias vias occultas; poterit a corde deduci per arterias; poterit etiam a glandulis advehi per lymphatica. Hæc thes. 25. enumeravi; & cum hæc de lymphaticorum usu opinio recensitissima esset, patronos ejusdem nominavi, primum scilicet authorem *Bilsum*, & huic in præsentī negotio assensum præbentem *Deusignium*. Ut autem manifestius evadat, me thes. 25. agere de viis in glandulas, non in os, adducam & thes. 29., ubi, quod priori me acturum promisi, aggredior: *Examinata sic cum glandulis saliva, reliquum est, ut vias materiam ejus advehentes indagemus. Quod ut commodius fiat, partes, cum quibus glandulæ commercium habent, singulas proponemus, & quibus mediis vel aliquid inde accipiant, vel eo mittant, inquiramus, ut suis singulis attribatur usus*. Hinc seorsum cor, nervos, glandulas conglobatas examino, quemadmodum thes. 25. pollicitus eram. Thesi vero 42., ubi ad *Bilsum* deventum, dixi, eum humores in corpore aqueos ipsamque salivam a ductu rorifero, non autem a sanguine, derivare, teque illi in hac de saliva opinione assensum præbere. Scilicet cum & *Bilsius*, e glandulis immediate salivam oriri, statuatur, mediate vero e ductu rorifero, cumque ipse, quam e glandulis maxillaribus promanare, ais, aqueam materiam ad glandulas per ramos roriferos ordinarie (de ordinario autem affluxu hic tantum loquimur) deferri videri, dicas, sanguinis autem nullam facias mentionem, quid manifestius, quam te illi in hac de salivæ mediata origine opinione assensum præbere? Sed his non consideratis *Vindiciarum* p. 23. primo, an non potius *Zassii* sensum pro *Bilsi* mente substituam, dubitas, hinc propria verba proferendo ostendis, te non unam, sed vel triplicem salivæ materiam constituere, adeoque conspiceris tandem, quod, non obstantibus verbis adeo manifestis, dicamus, te *Bilso* favere, atque assensum præbere hujusce de saliva opinioni, quæ nimirum hanc unice a rorifero succo per vasa communiter

lymphatica dicta advecto derivat. Qvod primum attinet, de re non dubia dubitando, te necdum *Bilfii* mentem percepisse, ostendis. Qvid enim clarius, quam eum salivam reliquosque humores aqueos inde deducere? Videamus *Epistolicam* ejus *Dissertationem*, ubi de ductus roriferi distributione ita loquitur: *Et ne distingvam omnia, denique in glandulas sputuarias, lacrymales, pituitarias cæterasque omnes & ubique influit, aut terminatur. Et circa finem de rore suo: Id quidem perceptu facile erit, si jam lacrymas, phlegmata, salivas, sudores, capillos, ungues ab illo provenire, totumque corpus nutritioni ejus irrotatione aptum reddi, omniaque naturæ fermenta ex eo derivari, ad oculum ostendatur: Qvod quidem fiet, &c.* Qvis hic dubitandi locus, ubi verba sunt adeo manifesta? Qvod vero secundum spectat, quæ non negavi, tanquam negata, probas. Loquor de præparata in glandulis saliva, quam, te a lymphaticis, non autem ab arteriis, deducere, ipsa tua verba ostendunt, tu autem, ac si de viis salivam in os immediate deferentibus egissem, plures te adduxissem, probas, quod a te factum non negavi. Qvod si itaque aliquid obtinere vis, hoc tibi probandum: *te cum Bilfio secretam in glandulis salivaribus salivam a roriferis ramis ordinarie non deducere unice, sed a sanguine.* Dum vero credis, te partem salivæ a sanguine deducendo mihi assensum præbere, a mente mea multum recedis. Duas enim salivæ vias immediatas proponis, ductus salivares puta & arteriolas, serisque aqvosiorem portiunculam per arteriolas ad os & palatum exsudantem ab illa, quæ a glandulis procedit, distinctam vis; cum ego arterias non immediate ad os deducam, nec salivaribus ductibus opponam, sed subordinem tanquam vasa illis materiam subministrantia. Nihil itaque minus, quam mecum sentis, qui feri ex arteriis exsudationem, qualem hic innuis, & *Clariff. Schneid.* tom. 3. sect. 2. c. 3. p. 509. expresse describit, necdum a quoquam vidi probatam, adeoque pro mero ingenii fœtu judico habendam. Omnibus enim in locis, quæ laudatus modo *Vir Celeberrimus* p. 554. catarrhorum pro fontibus habet, glandulosas carnes etiam ante visum mihi tomum ejus tertium observavi, & amicorum oculis subjeci. Sed & in epiglottide non glandulæ modo, sed etiam excretoria vasa per ipsam cartilaginem in partem oppositam penetrantia accuratius ea examinanti manifesta sunt, & in narium tunica ad latus illius ductus, qui a punctis lacrymalibus ad anteriora narium deferitur, aliud excretorium vas a minutis istis glandulis ortum

nuper observavi, ut adeoque veros catarrhorum fontes conglomeratas glandulas nobis præbere existimarem, quæ de re alibi, si Deo ita visum, fufius. Sed neque dum salivæ diversam naturam agnosco, & humorem mixtum profiteor, te mihi potius quam *Bilfio* faventem invenio. Non enim inde sequitur, me aliud, præter sanguinem arteriosum, ad partes vocare. Non sequitur: Saliva est humor mixtus, ergo non a solo sanguine est. De tertia salivæ materia, quam a cerebro ad glandulas defluere statuis, thes. 22. dixi, nos frustra ad occultas vias confugere, cum adsint manifestæ. Multas quidem a cerebro in os & hinc vicissim in cerebrum patentes vias recenset *Clariss. Falckenburgius* in *Epistola ad Johannem Neandrum de Tabaci Fumo*, sed videtur ossa capitis denudata potius, quam ipsum caput omnibus partibus instructum considerasse. Non negabo, posse tales reperiri vias, sed nec adesse credam, antequam adesse videro. Quod si itaque vel ratione quadam inexpugnabili, vel experientia certa ejusmodi meatus a cerebro in os ostenderis, magnam apud omnes veri cultores inibis gratiam. Cum itaque nec ex cerebro in glandulas, nec ex arteriis in os quicquam immediate deferri statuam, sed ex arteriis in glandulas, patet, te nulla in re mecum sentire; cum autem, quod in glandulis salivaribus secernitur, per ramulos roriferos ordinarie adferri videri dicas, sanguinem reticendo, omnibus manifestum est, te *Bilfio* assensum præbere.

Eadem thesi 42. exposita *Bilfii* de lymphæ motu sententia, adductoque, quo ille semper provocat, experimento, addidi, *hunc esse chyli motum, quem sibi demonstrari in Spicilegio 2. D. Bartholinus cupit, quem Bilfius in Epistolica Dissertatione adstruit, quem D. Borrichio, me præsentem, in vivo cane voluit demonstrare, ut mirer, D. Deusingium, in chyli nomine ex Bilfii mente explicando occupatum, Bartholinum iniquæ postulationis accusare. De illo enim humore loquitur, qui in lacteis mesenterii continetur, & quem inde ex parte per lymphaticam in hepar deferri Bilfius demonstrandum suscepit.* Non hic paria illis, quibus me in horum examine aggredieris, referam: dixi enim, me tuis hæc affectibus, non tibi, adscripturum; nec agam de ἀκυρολογία, quam ita fuscæ taxas, cum omnibus, qui vel epistolas Veterum triverunt, notum sit, amicos se invicem in litteris inviolata amicitia accusare, nec vocem accusandi adeo arctis inclusam esse limitibus; & mollias, quantumlibet illa de iniqua conditione, quæ, quod non promisit *Bilfius*, *Bartholinus* ex tua sententia flagitat,

explicesque quam amicissime, me sane repugnantem nunquam invenies. Nec enim eo hæc fine unquam proposui, ut te *Bartholino* invisum redderem, cum sciam, genus hoc proxenetarum Diis hominibusque invisum esse. Sed his missis ostendam, *Bartholinum* nihil nec in *Spicilegio Secundo*, nec in *Responsione de Experimentis Anatomicis Bilfsianis* (cujus loci citatio in thesibus fuit omissa) postulasse, quod non promissit *Bilfsius*, ut adeoque omnibus patere possit, te in re clara verbis obscuranda nequicquam occupari. Videamus *Bartholini* verba. Cum *Spicileg.* 2. cap. ultimo p. 100. & seq. de chylo & lymphæ *Bilfsii* mentem exposuisset, & singula examinasset, tandem in fine tractatus addit: *Eo vero* (scil. rore) *totum corpus nutritioni aptum reddi, irrotatione & fermentatione, promittit, se aliquando ad oculum demonstraturum. Quamquam de rore solo, si a chylo distingvatur, non repugnari, quia tamen aliter illi visum, nos magno desiderio istas demonstrationes expectabimus, ut proprius remoto velo intueamur, quid Nobilissimo Viro Natura revelaverit, & ut fidem suam brevi exsolvat, quanto possumus officio, rogamus. Optamus, ut suscepti negotii cursus illi arrideat, &c.* In *Respons.* autem p. 10. ait: *Nec animum obfirmabo facilis ad applausum, si istis Anatomiae Professoribus, præter alia, demonstraveris chyli ingressum in hepar, sed immediatum ex venis lacteis, non rubris mesentericis per longas ambages, quibus cum sanguine mixtus, chyli propriam appellationem amisit. Quis æquus rerum arbiter non videt, Bartholinum hic ejus, quod in lacteis continetur, motum sibi petere demonstrari, maxime cum adeo expressa habeantur verba? Scilicet in primo loco loquitur de roris distributione totali in totum corpus, in secundo de ejusdem distributione partiali in hepar. Quid autem Ros hic aliud Bilfsio, quam contentus in lacteis mesenterii succus? at hunc, quotiescunque lac referre visus est, chyli nomen a prima lactearum inventione obtinuisse quadraginta fere annos omnibus notum. Non hic repetam superius dicta, quo jure illa de statu controversiæ Bartholini verba contra me adduxeris, quasi in Spicileg. 2. tantum de vasis mesaraicis rubris ageretur, cum cuilibet Spicileg. pervolventi patere possit, etiam de lacteis & lymphaticis quæstionem esse, unoque posito alterum non excludi; suffecerit mihi ostendisse, Bartholinum non modo in Resp., sed & in ipso Spicilegio de contento in lacteis succo agere, ejusque motum sibi petere demonstrari. Hunc autem aliorum ex mente chylum, secundum propriam vero opinionem rorem, a lacteis &*

in hepar & in reliquum corpus deferri demonstraturum se pollicetur in *Epistolica Differtatione Bilsius*. Pergo igitur, inquit, liquor ille, quem ab usu rorem dicimus, venas lacteas per earum in intestinis aperta oscula invadit, & seorsim congregatis canalibus in duas se vias dividit, illa ad glandulam, quæ venæ portæ affigitur, ducit, atque inde vasa lymphatica propagat jecori: altera in glanduloso mesenterii receptaculo convenit, unde totum corpus ramis evidentibus inferius superiusque instaurat, &c. Sed, dicas, de resurrectione hepatis agitur, adeoque de veri chyli & proprie ita dicti motu, *Bilsius* autem, lactearum contentum chylum esse, pernegat; hinc addis p. 17: Interea vero, ne credat *Vir Clariss.*, adeo vecordem esse *Bartholinum*, qui velit se facilem præbere in admittenda hepatis resurrectione, si modo ipsi probetur a *Bilσιο*, humorem illum, qui in lacteis mesenterii continetur, quem a lymphâ *Bilsius* non distingvit, per ipsa illa lactea seu lymphatica vasa in hepar deferri: cum ne ipse quidem *Bilsius* illum humorem idoneum agnoscat, ex quo sanguis queat generari. Sed, quantum video, *Exsequiarum Hepatis* occasionem aut ignoras, aut ignorare te simulas: hanc enim si considerasses, in illa nunquam verba erupisses. Inspice enim, si placet, c. 8. *Vas. Lymphat. Barthol.* in *Animantibus Inventorum*, ubi inter alia ita loquitur: Igitur si quidem vascula nonnulla circa hepar semper observavi, hactenusque pro lacteis habui, jure justo, donec aliud persvaderet Naturæ favor, chylum ad hepar partim distribui, partim ad cor existimavi: jam vero, quia primis nobis *Hafniæ* tam nuper licuit esse oculatis, ut, quid sint vasa illa exilia, unde progrediantur, quem usum præstent, in animalibus diligenter evisceratis investigaverimus, noluimus antiquatæ opinioni obstinatius inhærere, aut labantes hepatis derelicti partes diutius sequi. Vidimus quippe vasa illa prope hepar esse sui generis, a contento liquore Lymphætica nobis dicta, ex hepate ad receptaculum aquam inferre, ligataque intumescere prope hepar, adversa vinculi parte inaniri, similiaque esse & substantia & colore & contentis & usu illis, quæ ex artubus & infimo ventre alias primi aperuimus. Hoc invento novo spe omni sanguificationis excidit tot seculorum applausu decantatum hepar, quod ne salus ipsa servaret amplius, &c. Quod si itaque lymphæ motus *Bartholino* occasionem dederit hepati exsequias scribendi, sequitur, motu hoc negato, etiam has frustra scriptas. Quod cum fecerit *Bilsius*, non sine jure demonstrationem ejus flagitat *Bartholinus*, nec pro vecordi habendus, si velit se facilem præbere in admittenda hepatis

refurrectione; modo ipsi probetur a *Bilfio*, humorem illum, qui in lacteis mesenterii continetur, per illa deferri ad hepar. Quid enim manifestius? *Qvod in lacteis continetur, in hepar non deferri, cum observaret Bartholinus, detexit nobis lymphatica, & hepatis exsequias scripsit. Qvod in lacteis continetur, deferri in hepar, statuit Bilfius, ejusque demonstrationem promittit; ergo, si vera hæc, ruit lymphaticorum inventio, ruunt hepatis exsequiæ. Vidit hoc ipse Clariss. Bartholinus, qui Spicileg. p. 104., membro secundo, quod de rore agit, subjungit: In hoc cardine salus observationum nostrarum volvitur. Cum itaque res adeo perspicua sit, quid in verbis hæres, & Bilfianam chyli interpretationem urges, quasi vera rerum vocabula a Bilfio essent expectanda? De motu humoris lactei agitur, non de nomine, quem si, secundum promissa, ostenderit Bilfius, assensum obtinuit & applausum.*

Cum itaque satis pateat, quæ de *Bartholino*, de *Te*, de *Bilfio* proposui, licet ipsa adjungere verba conveniens disputationi brevitatis non permiserit, sensui tamen vestro verbisque conformia esse: transibo cætera, & de suspitionibus, quas tibi formas, æquo Lectori judicium committam. Interea si ulterius mea examinare placuerit, tantum temporis tibi indulgeas, rogo, ut cum verbis verborum confideres occasionem. Mallem tamen, ipsas res aggredi liberet, &, si quid vel experimentis, vel rationibus a me allatis deesse videris, proferre: invenires enim me æque promptum ad argumentis tuis, si ratione nitantur & experientia, cedendum, ac ad iisdem, sicubi prædicta defuerint, resistendum. Vale.

Lugduni Batav.

Anno 1661, 28.18. Novembr.

The letter is written in a very formal and polite style, and is addressed to the 'Dear Sir'. The author is a man of letters, and his letter is full of references to books and other literary works. He is writing to the reader to inform him of the progress of his work, and to ask for his opinion on the matter. The letter is written in a very formal and polite style, and is addressed to the 'Dear Sir'.

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DE GLANDULIS OCULORUM
NOVISQVE EARUNDEM VASIS
OBSERVATIONES ANATOMICÆ



VIRIS CLARISSIMIS & EXCELLENTISSIMIS,

D. SIMONI PAULLI,
Medico Regio & Prælato
Aarhufienfi,

D. FRANCISCO DE LE BOE
SYLVIO,
Medicinæ Practicæ,


D. GEORGIO HILARIO,
Mathematico & Litteratori,

D. JOHANNI VAN HORNE,
Anatomiae & Chirurgiae,

D. OLAO BORRICHIO,
Polyhiflori & Naturæ Confulto,
illi olim,
his hodie
in Regia Haf. Academia

D. JACOBO GOLIO,
Mathefeos & Lingvæ Arabicæ
in Alma Lugduno-Batava Acad.

Profefforibus Celeberrimis,
Præceptoribus optime meritis, ætatem colendis.

VÆ nova se vobis hic sistunt, Præceptores, non eo nomine pro novis venditantur, ac si jam primum essent producta. Antiqua sunt, ipsis, qui se προσεληνους jactabant, Arcadibus, & universo adeo hominum genere antiquiora, utpote, quæ brutis ante conditum hominem, id quod sacra testatur pagina, creatis connata. Nec quod nunquam ante observata credam, ideo nova nuncupo; licet tot tamque discrepantes de origine lacrymarum viisque opiniones, quot in mare flumina decurrunt, id tantum non demonstrare videantur. Estimât Ingeniosissimus Stevinus, suspicantur alii, fuisse seculum in studiis aureum: nec dubito, quin omnia Veterum scripta nobis si adessent, multa, quæ hodie nova & magno cum labore quæsitâ miramur, sine sudore, sine sanguine inde licuisset addiscere. Cum vero mihi nova sint, ut quæ nullius vel manus, vel vox, vel scripta mihi detexerint, cum inclyta Nobilissimæ Lugdunensis Academiæ Theatra Anatomica novis ea annumeraverint, si rem, ut est, verbis non exprimerem, levitatis esset non leve argumentum. Nec enim illorum ego supercilium moror, qui in aliorum labores involant, ipsi manum operi nunquam admoventes; his enim, si quid ausi fuerint, vestrum, Celeberrimi Viri, applausum, vestram auctoritatem oppono. Quia ego tutus ægide paucis illa proponam, quæ pluribus diducere licuisset, si vel, quæ ex dictis sponte profluunt, fusius evolvendo, tempus terere mens fuisset, vel aliorum scrinia compilando, lectoribus fastidium, mihi Crispini famam conciliare intenderem. Vos itaque tenellum hunc foetum vestro sinu excipite, & quo me hactenus profecuti estis amore, amplexari pergite,

Celeberrimi Viri,

Discipulum vobis addictif:

Lugd. Batav.
Anno 1661.
6. Decembr.

NIC. STENONIS



QUOD Mechanicos usus docuit, forsan & in animalibus facta observatio, ut ad motum faciliorem reddendum res movendas humore unctuofo oblinerent; hoc in prima animalium fabrica Mechanicus omnium ingeniosissimus quam perfectissime observavit. Videntur illi, si movendum inter & fixum, super quod motus fieri debet, tertium motu facilius intercedat, opus longe commodius procedere, hinc, ut suppositis cylindris in æqvora navem propellunt, sic &, super quem rota volvitur, polum liqvore pingviori inungentes gyrationem facilius expediunt. Sic & alios motus, quorum exemplis officinæ hinc inde abundant, quiescentem a mobili superficiem intercedente subpingvi liqvore dividentes, minori cum molestia perficiunt.

In automatico autem animalium corpore artificiosius, imo divinius, hæc omnia geruntur; ibi enim & humor, qui subministratur, &, quo subministratur, modus longe majus artificium commonstrant. Partes quippe ita dispositæ sunt, ut in vicinia, velut in promptuario, reconditus liqvor pro majori minorive usu parciore aut copiosior, nobis ne attendentibus quidem, exprimatur, inde, ubi munere suo functus, per alias vias alias ad partes iterum abducendus. Sic partium in ore motus accedente saliva promoventur; sic deglutationem expressus ab ipsa re deglutienda ex substratis tunicæ glandulis unctuosus mador leviozem reddit. Eodem fine totus intestinorum canalis interiori parte viscida pituita est obductus; nec aliam ob causam in plerisque aliis nostri corporis partibus moderata certi

humoris copia reperitur. Sed præ cæteris in oculis elegantissime hæc conspiciuntur; ibi enim &, quæ palpebrarum motui inservientem humorem afferunt, &, quæ eundem alio inde derivant, vasa peculiaria se offerunt consideranda. Quæ cum nondum ita notata sciam (afferentia enim necdum descripta puto, efferentia vero, licet principium habuerint omnibus manifestum, continuationem tamen eorum magnis seculi hujus Anatomicis non innotuisse, ex scriptis eorundem patet), statui ea in præsens, ut in brutis variis, præsertim vitulis, a me observata, una cum glandulis describere.

Glandulæ autem interioræ palpebrarum superficiem humectantes binæ sunt, lacrymalis altera, altera Clariss. Whartono innominata dicta, ex conglomeratarum genere utraqve. Videtur quippe conglomeratarum hoc esse munus, ut peculiarem per lymphatica excretoria excernendum humorem præparent: quod ante tantum in pancreate & maxillarium inferiore observatum, jam vero in pluribus aliis manifestum; ut præter illa, quæ de stomaticis dicta, etiam aliæ carnes ex glomosis glandulosis compositæ demonstrant: quales & sub narium tunica tum interiore, tum posteriore, & sub tunica faucium, & in epiglottidis superiori parte observantur, unde per ipsam cartilagineam ad inferiorem partem meatus reperiuntur conspiciui; in quibus lymphaticorum præsentiam facillime licet demonstrare. De glandulosa carne, quæ in meatu aurium externo cartilagineam inter & cutim se offert, res non ita manifesta; cum ceruminum color aliam videatur originem agnoscere. Sed non mirum, flavum illis e glandulis succum excerni, cum etiam ex oris glandulis similis exprimatur; quod in bubulo capite, ut & ovillo, mihi perspectum. Quid quod & aqvofas excretiones sine ulla auditus læsione per aurem factas (quarum Platerus meminit, qui tom. 3. l. 2. c. 7. refert, cuidam puellæ ad mensuras aliquot diu per vices citra ullam aliam læsionem inde profluxisse) ex illis vitiatis originem ducere opinarer, cum alias per tympanum, auditu manente integro, vix potuisset penetrare. Vel dicendum forte, obstructo, qui ad nares pergit ab auribus, canali, illac excernendum humorem hac tandem viam invenisse. Ut ut autem sit, prædictus conglomeratarum usus experientiam indies magis magisque sentit faventem, quod & sequentia confirmant.

Glandularum oculi altera, quam *innominatam* vocant, in superiori exterioris anguli regione sita, magna & fere rotunda eo in loco conspicitur; unde ad inferiorem orbitæ partem inflexa in angustam

veluti laciniam sensim attenuatur. Pars ejus anterior per loborum, in quos eleganter divisa est, intervalla prodeuntibus ex ipsa glandula, quæ humorem ibi secretum excernunt, vasis liberum exitum concedit; quæ inde interiorem intra palpebrarum tunicam antrorsum pergentia exiguis eandem foraminibus ad brevem a ciliis distantiam pertundunt. In conspectum facile protrahuntur prædictorum fluminum ostia, modo inversam in exteriori angulo palpebram tantillum extenderis; mox enim ad medii pollicis ab exteriori limbo recessum, in ipso angulo tria, infra quatuor, supra sex, interdum & septem patebunt: per quæ immissa sine sectione seta facilem in ipsam usque glandulam transitum offendit. Hæc superior mihi annus vasa detexit, cum 11. Novembr. eruti ex orbita ovilli oculi palpebram exterioribus tunicis nudatam candelæ lumini exponerem, an pellucida esset, exploraturus; mox enim splendentes lymphæ rivuli suo se indicio prodiderunt.

Altera *lacrymalis* dicta, oblonga, in vitulo, & in cantho interiore seu majore recondita, præter vasa sanguinea & nervos, quæ illi cum reliquis glandulis omnibus communia, etiam cartilagine prædita est peculiari, & duobus præterea lympham evehentibus vasis donata. *Cartilago* duabus constat partibus, altera *tenuiore*, quæ cuiuslibet vituli oculum insipienti se offert, lata, semirotonda, & ad membranæ naturam accedens, imo in membranam degenerans, cui limbus prætexitur crassior, &, quæ oculum tangit, planus, aversa autem parte crenis paulo obtusioribus, asper: altera *crassiore*, quæ vere cartilaginea est, & alba, quæ medio limbo continuatur, arctior, hinc in majorem amplitudinem sensim expansa ipsam glandulam inter & oculum fertur, ubi iterum angustior reddita circa medium glandulæ definit. *Excretoria vasa* bina sunt, quæ, intra glandulam orta, & ad cartilaginis latera assurgentia, ubi hæc superiora versus arcatur, cartilaginem inter & oculum se aperiunt ostiis, non passim quædam, sed solo hiatu dignoscendis; quæ ratione se mihi primo obtulere, cum 19. Junii hujus anni in oculo eruendo occuparer.

Puncta lacrymalia, ut in ove, vitulo, cane observavi, licet in utrovis oculo ad majorem angulum bina appareant, ubi tamen ad foramen lacrymale ossi inculptum continuaveris, in unum truncum concurrere videbis; qui, ubi canalem osseum superavit, ad interius reliqui ossis latus anteriora versus productus, non procul ab extremo narium definit foramine uno quidem, sed admodum manifesto.

EXPLICATIO FIGURARUM

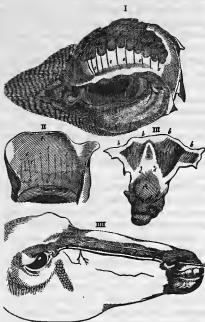


Fig. I.
exibens oculum vituli
finiftrum.

- A. *Glandula oculi superior, alias innominata dicta.*
- b. *Angulus oculi major.*
- c. *Angulus oculi minor.*
- d. d. d. *Lobi, in quos anterior glandulæ limbus est divisus, per quorum interstitia lymphatica, e. e. e., exeunt.*

Fig. II.
A. *Interior palpebræ superficies.*
b. b. b. *Glandula innominata, quæ una cum vasculis, c. c. c., per tenuem palpebræ tunicam transparet.*
d. d. d. *Oscula vasorum lacrymalium.*

Fig. III.
A. *Glandula lacrymalis in interiori angulo sita.*
B. *Cartilago ex ipsa glandula prodiens.*
b. b. b. *Limbus cartilaginosus.*
c. c. *Membrana.*
d. d. *Ostia duo, ad utrumvis cartilaginis latus unum.*

Fig. IV.
a. a. *Punctorum lacrymalium ad extremas nares continuatio.*
b. b. *Vas excretorium naribus proprium.*

Licet autem prædicta vasa non nisi in brutis viderim, quin tamen etiam homini sint concessa, nullus dubito. Cum enim & glandulæ illi adsint similes, simili in loco sitæ, cum humor, qui sub palpebris reperitur, non sit diversus, oportet, etiam ejusdem generis vasa ibi admittantur. Sic & puncta lacrymalia in homine, non minus quam in brutis, conspicua satis arguunt, continuationem eorundem etiam in homine inveniendam.

Ex hisce glandulis earumque vasis, qui palpebras inter oculique globum observatur, humor procedens per lacrymalia puncta in nares defluit: qui modo parcius accedens a paucis observatur, modo impetuosius profluens lacrymarum nomine venit; de cujus origine quam varia a diversis fuerint tradita, nemini ignotum; ut vel hoc argumentum ex illis unum esse possit non postremum, quæ, quam parum ingenii, etiam subtilissimi, vis valeat, nisi sufficientia habuerit experimenta, demonstrant. Quid enim non a variis hac in parte excogitatum? Fuere, qui, lacrymarum materiam a parcius allabente humore distinguentes, diversam utrique originem assignarunt; sic e venis oculorum hunc exsudare, illas a cerebro provenire, *Platerus* statuit. Nec, qui e cerebro lacrymas derivant, inter se consentiunt: alii solo cerebro contenti de viis dissentiunt, dum hi anteriores choanæ canales, illi nervos, isti venas, &, nescio quas non alias, vias excogitarunt; quidam vero præter cerebrum alias in auxilium vocarunt partes; sic eas partim a cerebro per secundum ossis cuneiformis foramen, partim a vertice capitis & lateribus ad punctorum lacrymalium ductum confluere, *Veslingius* putat. Qui cerebro excluso alia putarunt afferenda, nec hi inter se consentiunt, quidam enim ab oculorum nutrimento, alii a crystallini humoris vitreique excrementis deducunt, *Clariss. Schneiderus* proxime ex arteriis, *Ingeniosissimus Cartesius* ex vaporibus, qui ex oculis, quam ulla alia parte, ob nervorum opticorum magnitudinem & multitudinem parvarum arteriarum, copiosiores egrediuntur.

Sed licet ex illis variæ opiniones satis ingeniosæ magna probabilitate *niti* videantur, experientia tamen longe alias vias demonstrat, ordinario Naturæ modo magis convenientes. Ut enim, quæ omnibus partibus communia, universalibus organis peraguntur, sic, quæ singulis debentur pecularia, peculiaribus locis præparantur, & per vasa pecularia excernuntur. Existimo itaque, manifestum satis esse, illum saltem humorem, qui motui palpebrarum inservit, ex arterioso san-

gvine in glandulis secretum per descripta modo vasa adferri. Qvem ufum etiam alii illis attribuerunt, quibus tamen vasa nondum fuere cognita. Clariff. enim Wharton. *Adenogr.* c. 26. ait: *Non negandum, easdem humiditates aliquas, quanquam non ea copia, qua lacrymæ stillant, suppeditare, licet idem brevi ante dixerit: Verum quo modo glandulæ illæ humiditates has exspuant, vel per quæ vasa easdem excipiant, nemo adhuc demonstravit.*

An autem & lacrymæ inde deducendæ, dubium videtur, cum magni viri glandulas illas muneri huic non satis idoneas judicarint. Non enim crediderunt, posse ex tam parvis glandulis tantam lacrymarum copiam prodire, & sequeretur, etiam brutis attribuendas lacrymas, quod multis absurdum videtur.

Sed, quod primum spectat, si guttarum magnitudo cum tempore, quo colliguntur, conferatur, nulla hic videbitur difficultas. Nec enim tempus adeo breve, quin per plura vasa tantum humoris affluere possit, quantum ad guttam constituendam requiritur; nec, qui ex oculis emanat, humor totus in glandulis antea fuit coactus: sufficit, ex eo, qui singulis pulsibus appellit, arterioso sanguine celeriore in glandulis fieri secretionem, de qua mox pluribus. Quod vero bruta attinet, cum & illis hæc glandulæ & hæc adsint vasa, poterit & in illis (quod sæpius observatur) copiosior ex angulis oculorum emanans humor lacrymarum speciem præbere, qui non minus lacrymarum nomen meretur, quam qui ex oculis hominum sine ullo animi motu ob solam materiæ copiam, aut irritationem, organive vitium promanat.

Existimo itaque, lacrymas nihil esse nisi humorem, qui oculo irrigando destinatus est, majori copia affluentem, ideoque, cum vasa in glandulis oculorum observata manifestas & propinquant ostendant vias, ex occultis aliis aut remotis non deducendas. Non negaverim, ut ex oculis humor per ductum peculiarem in nares stillat, licet ipsæ suis glandulosis carnibus non destituantur, sic quoque ex cerebro fortassis humorem subsalsum per singularia vasa in oculos derivari posse; sed quia suspiciones pro veris venditare meum non est, in medio hæc relinqvens, quæ manifesta sunt, proponam: cum ex iis omnia, quæ circa lacrymas observantur, phænomena commode possint explicari.

Scilicet quemadmodum cum & sanguis bene se habet, & organa rite sunt disposita, palpebrarum motum expeditiorem reddens hu-

mor naturali copia affluit, & per convenientia foramina in nares derivatur, sic, si vel internas, vel externas ob causas alterutrum mutetur, etiam humoris mutabitur effluxus. Organa quod attinet, possunt &, quæ materiam subministrant, vasa, &, quæ secernunt, glandulæ, quæque secretam educunt, excretoria vasa considerari. Si sanguinem advehentia vasa ad revehentia naturalem in amplitudine proportionem non servant, nec humoris secernendi naturalis effluxus poterit expectari. Namque ut sanguis, quo facilius ex arteriis in venas transit, eo minus patitur immixta a se secerni, secernendum enim una cum reliquo per patentiores vias egreditur, nec per dicatos sero meatus nisi lente transeunt, quæ meatibus vicinæ, partes, reliquis libere præterfluentibus: sic, quo difficilius, eo copiosius per simplices & porosas capillarium intra glandulas existentium tunicas exprimitur serum; dum enim in angustis illis versatur, nec eadem, quæ affluit, per venas refluit libertate, quicquid per alias vias egredi aptum est, ingreditur illis majori, ac naturaliter solet, celeritate, ut ita viarum angustiam transitus celeritas compenset. Atque ita, licet nec plures, quam naturaliter adfunt, aperiantur meatus; licet hi meatus non dilatentur (dilatati enim ita, ut una vice pluribus, quam uni serosæ parti vel hanc constituentibus minoribus, transitum præberent, facile etiam crassiores sanguinis partes admitterent), sola tamen partium per meatus illos transeuntium celeritas majori lacrymarum copię producendæ sufficit, a mutata vasorum in amplitudine proportione deducenda.

Ut autem variatæ proportionis hujus proxima habeatur causa, videndum primo, in qua parte fiat mutatio, dein, quid mutationem producat. Cum tria tantum materiæ huic vehendæ destinata adhuc dum innotuerint vasa, arteriæ, venæ & lymphatica excretoria, excretoria autem ejusmodi mutationi recipiendæ inepta sint (constricta enim minus ac ante reciperent, ampliata vero secundum continuos sanguineis meatus alia, præter serum, transmitterent, secundum reliquum autem ductum dilatata majorem solito humoris copiam non acciperent, nisi forte tractio quædam fingenda esset, quæ suctione, vel alia quavis ratione serum attrahendo celeriore contentum conciliaret, qualia jam vix admittuntur); relinquuntur venæ & arteriæ, quarum vel alterutri, vel utriusque insoliti quid contingit. Cum autem tota mutatio in eo consistat, quod liberius affluat, quam refluat, sanguis: vel amplicatæ erunt arteriæ, vel constrictæ

venæ, vel utrumqve; cum autem vasis aliisve, quæ circulares habent fibras, constrictio proprie contingat, dilatatio vero non nisi per accidens, non in arteriis quærenda erit mutatio, sed in venis.

Locus autem venarum, qui hoc modo constringi poterit, dum voluntariæ fluunt lacrymæ, non unus est. Vel enim, quæ cordi vicina, pars, vel, quæ arteriis continuantur, extrema, vel media via huic mutationi obnoxia est. In cordis vicinia offert se musculosa cavæ portio, ideoque animæ imperio sine controversia subjecta, quæ, prout diversimode movetur, sic duos primarios effectus edit, unde multa in animi motibus peculiararia procedunt. Scilicet vel utrumqve, sanguinem descendantem puta, lymphæ plenum, & adscendentem, in iratis ad minimum ex omnium sententia bile mixtum, insolita inter se proportionem, solito parcius copiosiusve cordi ingerit; vel unius plus alterius minus immittit, atque ita naturalem proportionem immutat; unde varia in diversis animi motibus occurrentia symptomata clare & distincte possent deduci: quæ omnia latius exponere hujus loci non est. Sed in lacrymarum profusione, licet non dubitem, hanc partem multum agere, & non modo plus sanguinis cordi suppeditare, quod gemitus, rubor genarum, partium in facie interdum tumor indicant, sed & concurrentium proportionem mutare, quod indicat copiosius in sanguine serum, ideoque, per respondentes sibi meatus nisi excernatur, capitis dolores inducens, & alia, quæ, si lacrymæ supprimantur, observare licet, certo indicio naturalem humorum dispositionem esse mutatam; cum tamen cor in omnes partes sanguinem æqualiter distribuat, in multis vero sentibus præter lacrymas vix quicquam observetur; cum sæpe in motibus corporis, ira aliove sanguinis æstu ab ambiente vel assumptis excitato, sanguini præter solitum distendantur arteriæ, nec tamen lacrymæ oboriantur, nisi in magnis commotionibus, ubi tamen doloris quoque sensus tristitiam excitans concurrat: requiritur particularis locus & oculorum glandulas, quam alias partes, magis respiciens. Sic & medii vasorum ductus licet aliquid pati videantur a mira partium faciei distorsione, quam in pueris, & antequam profluunt, & dum fluunt lacrymæ, conspiciamus, si tamen intra glandulam nulla in vasis fieret mutatio, nec ulla feri a sanguine præter solitum, in illa tantum parte fieret secretio. Restant itaque extrema venarum, intra ipsas oculorum glandulas utcunque arteriis continuatarum, quæ & contrahi possunt, & angustiora reddita proximam auctæ secretionis in

determinata parte causam præbere, quæ de re videri possunt, quæ & supra de mutata vasorum in amplitudine proportionem diximus, & in posteriori *De Glandulis Oris Disputatione*, thes. 39., proposuimus.

Exposita sic parte mota, facile est moventem invenire. Cum enim animi motum, ut tristitiam, gaudium, interdum & iram lacrymæ sequantur; cum prorumpentes lacrymas ad tempus suppressere in nostra potestate sit; cum easdem pro lubitu fingere puellis, quæ, ut flerent, oculos erudiere, facillimum sit: manifestum est, illud, quo mediante alios in corpore motus pro arbitrio anima excitat & sistit, spiritus puta animales, etiam has in glandulas determinari, earumque partes movere, maxime cum, per quos illa vis reliquis partibus communicatur, nervi in glandulis adsint manifesti, & singularum in glandulis observatarum partium inductione nervorum cum venis consensum rationi consentaneum ostendere liceret.

Atque sic vasorum sanguineorum in amplitudine mutatam proportionem vidimus, quæ tamen sola non sufficit secretioni lacrymarum augenda, nisi & materia in sanguine fuerit lacrymis producendis idonea, eademque a sanguinearum partium amplexibus fuerit liberata. Hinc ratio, cur lacrymæ interdum in longiori fletu subsistant, assumpto potu statim redituræ; hinc etiam manifestum, cur iussæ interdum non profluant, juxta illud *Ovidii*:

*Si lacrymæ, nec enim veniunt in tempore semper,
Deficiant — —*

Eandem quoque ob causam pueri puellæque & senes in ejusmodi animi motibus ubiores, ac mediæ ætatis homines, lacrymas fundunt. Quod autem in summo mœrore etiam sanguinæ observatæ fuerint lacrymæ, valde nostræ favet sententiæ, si enim venæ arteriis non angustiores redditæ liberum sanguini transitum concessissent, per tenellos serosis partibus tantum accommodatos meatus sponte nunquam exiisset. Oportet itaque, sanguinem impedito in venas refluxu quosdam sero excernendo accommodatos meatus vel dilatasse, vel rupisse, atque sic viam invenisse, quam tenuit, usque dum, cessante spirituum animalium in prædictas partes determinatione, per solitam viam liberius remeare licuerit.

Atque ab hac mihi causa procedere videntur, quas voluntarias appellat lacrymas, quo etiam illæ, quæ in magno movendi conatu

præter voluntatem erumpunt, nec non a fumis & halitibus eliciuntur mordacibus, ex parte reducendæ.

De cæteris, quæ spontanearum nomen obtinere, res facilis. Vel enim causas habent in oculos incurrentes, ut si cum excretoriis vasis afficiantur glandulæ, aut humoris naturali copia affluentis per elices in nares transitus impediatur; vel peccanti in sanguine sero debentur: cujus partes si ob elementorum proportionem cum lacrymis, quam cum sudore, urina, succo pancreatico, saliva affinitatem habuerint majorem, non mirum, per convenientes partium suarum figuris meatus in oculorum glandulis excerni, unde varia, quæ lacrymas, in morbis occurrentia symptomata commodè liceret explicare.

Sic refert Clariss. Bartholinus hysteriæ cujusdam paroxysmos, non nisi subito ubere lacrymarum fluxu, sponte solutos. Quo in casu existimarem, qui sanguinearum partium vinculis arctius irretitus humor varia, quæ motum, quæ sensum aliasque functiones, in toto corpore symptomata excitabat, tandem vel medicamentorum vi, vel intestino heterogenearum in sanguine partium motu ab aliorum amplexibus liberatum, quod lacrymis, quam reliquis humoribus, similior esset, per illarum vias exitum invenisse. Cur autem ad earum propius quam aliorum humorum naturam in illa femina accesserit, licet feminarum ad lacrymandum proclivitas aliquid eo conferre potuisset, cum tamen in aliis idem non observetur, non, nisi examinata ægræ natura, certo determinare licet. Possem alia de ophthalmia ejusque curatione addere, sed cum, viis jam detectis, illa sponte pateant, quæ verum glandularum oculi usum, verosque lacrymarum fontes spectant, hisce proposuisse contentus, fusiorem variorum, quæ eo reduci possent, deductionem eo usque differam, donec integram glandularum historiam pertexere Numen permiserit, ubi simul ostendam, quæ ratione glandulæ cuti undique substratæ sudorem producant.





DE NARIUM VASIS





NTE autem, quam a tabula manum removeam, non possum, quin, quæ mihi lacrymarum collicias, effractis narium ossibus, penitus investigare conanti in ipsis se naribus obtulerunt, prioribus appendicis instar adnectam, cum idem plane, quod oculorum theca, artificium præ se ferant.

Nares succingens tunica cum non modo in demortuis, tum hominibus, tum brutis, humida reperiatur, sed & in vivis perpetuo quodam madore percipiatur irrigata, nec tamen perpetuus e naribus aquosus humoris profluat rivus; necesse est, vias dari tum in nares humorem illum deponentes, tum eo in loco depositum alia inde via abducentes. In hanc me non de naribus modo, sed & pericardio aliisque partibus, opinionem jam tum pertraxerat oculorum & oris fabrica: sed cum argumenta Anatomica, præter analogiam, etiam αὐτοψίαν requirant, suspicionibus tantum annumerandam duxi, eo quod utrumque hujus propositionis membrum suos videbatur expectare adversarios. Priores enim vias in dubium vocarent, qui ad odores bene percipiendos siccas, non unctas, requirunt nares, & magni Hippocratis verba vel dubitantibus opponunt, quæ *Libr. de Carn.* leguntur: Καὶ ὅταν μὲν ξηρὰ ἢ τὰ κοῖλα τῆς ῥινός, ὁσμᾶσθαι τῶν ξηροτέρων αὐτὸς (ὁ ἐγκέφαλος) ἑωυτοῦ ἀκριβέστερός ἐστιν; & mox: ὁκόταν δὲ ὑγρανθῶσιν αἱ ῥῖνες, οὐ δύναται ὁσφραίνεσθαι. Quod si itaque odoratus organi siccitatem requireret, nulla hic admittenda vasa, cum non modo nulli essent usui, sed & ipsum impedirent sensum. Posteriores vero ab

imminente faucibus hiatu diverfos non facile admitterent, qvi narium humorem, si quis effet, aut a prætervecto aëre exsiccare posse contendunt, aut per patentes vias in fauces rejici; atqve ita, licet illis humiditas canum, qvorum odora vis nulli non cantata, nares, & ipsam humoris necessitatem ad halitusorum corporum faciliorem in poros ad nervorum extrema transitum objicere potuisssem, licet his tum illum & in homine, & in brutis, narium situm, qvi non patitur, humorem in fauces relabi, tum illam humoris naturam opponerem, ut non possit ab aëre solo intra pectus pulso, vel ab eodem una cum calidis fuliginibus e pulmonibus rejecto in tenues auras dissipari, id qvod ipse Vulcanus, si ad partes vocetur, demonstrat: dubius nihilominus hærebam, usqve dum præter aquæ ductum jam ante cognitum, & præter glandulosas carnes tunicæ Schneidero pituitariæ appellatæ, etiam punctorum lacrymalium in nares usqve continuationem, aliumqve naribus peculiarem ductum, omnia nares humectantia vasa, & simul angustum quasi fretum, per qvod contentus in naribus humor in palatum transmittatur, observarem; tum enim patebat, nisi Hippocratis verba de immoderato humore essent intelligenda, ipsi experientiæ bellum esse indicendum.

De primo nares irrigante canali, s. aquæ ductu, humorem, qvo aurium cavernæ maduerunt, eo deferrente, cum a variis Celeberrimis Viris sit descriptus, nihil hoc loco addam, sed reliqvis annu merasse contentus ad sequentes pergam.

Secundum, per qvem ab oculis in nares derivatur humor, qvod attinet, cum in antecedentibus p. 84. fuerit descriptus, nec ille diu nos morabitur. Clariss. Veslingius existimat, definire illum intra palpebrarum tunicas, cui suum etiam calculum Celeb. Schneiderus addit, qvi De Catarrhis, l. 3. c. 9 p. 348. ait: *Ante hunc authorem (sc. Vesling.) hæc & hujusmodi alia pervidimus, ac multis locis docuimus, hæc foramina non ulterius ferri. Nam palpebra ex duabus constat membranis, inter has usqve ad orbitæ finem excurrit hoc foraminis genus, & inibi definit.* Sed in nares usqve pertingere, non in brutis modo, sed & in homine, una cum Clariss. D. van Horne, jam secundo observavi. Mirum sane, exercitatissimum Virum Fabricium ab Aquapendente, qvi nervosum in ipso ossis lacrymalis meatu observavit ductum, eundem punctis lacrymalibus continuum non perspexisse. Sic enim de ocul. part. 1. c. 13. refert: *Propter quam causam Natura sapientissima duplicem viam ad lacrymas expurgandas*

paravit. Una est per oculorum utroque angulos, alia per nares. Etenim in utraque extremitate tarforum, superna scilicet & inferna, bina in utroque angulo foraminula apparent, tam exigua atque angusta, ut vix in viventium corporibus adspectabilia sint, in cadaveribus autem omnino sensum effugiant: per quæ lacrymæ, cum effunduntur, exeunt, potissimum autem per internum angulum, quo ut declivior utitur Natura ad lacrymarum effluxum. Alia autem atque adhuc patentior via nares sunt, in quarum summitate ad internum angulum foramina in offe insculpuntur tam magna, ut quivis ea admiretur: quæ si attente intuearis, insignes quidam canales tibi videbuntur eo loci ad hunc usum excavati, ut lacrymæ per nares expurgentur, quin etiam ductum quendam nervosum ab oculis in ejusmodi foramina ingredi videbis, quasi accommodatum canalem ad lacrymas in nares derivandas. Mirum, inquam, Virum Celeberrimum, una cum aliis ejusdem sententiæ patronis ea dividere, quæ Natura voluit esse conjuncta.

Tertio loco, quæ in ipsa narium tunica oriuntur, vasa examinanda, quæ duum generum sunt: breviora alia, & vix nisi per expressum humorem, cujus guttæ sensim prodeuntes vasorum ostia produnt, conspicua; alia longiora, quæ veri canalis nomen merentur.

Breviora vascula illum effundunt humorem, quem in membrana pituitaria anteriore observavit Schneiderus. Cui Celeberrimo Viro ad stipulari nequeo, dum membranæ munus illud totum adscribit, nulla glandularum facta mentione: cum tamen sub ipsa membrana vasorum, quæ copiosa ibi reperiuntur, extremis affusæ sint glandulosæ portiones in parte narium anteriore minores, quo vero posteriora versus magis recesseris, majores, unde exigua quædam excretoria oriunda secretum ex arterioso sanguine humorem emittunt.

Longiora vero in homine quidem nondum vidi, in ovibus tamen canibusque non raro notavi. Sunt autem bina, in utraque narium cavitate unum, ubi & originem agnoscit & finem. In illis enim, quæ sub narium tunica in ovibus dispersæ latent, glandulis radices plurimæ supra molarium regionem observantur eleganti ordine dispositæ, e quibus unum in truncum coeuntibus ductus exurgit, qui, ubi sub nervoso canali dorsum versus ascenderit, in anteriora inde reflexus dorsum inter & continuum punctis lacrymalibus vasculum progreditur, donec circa extrema fere narium, quo loco supra reliquam plantitiem cartilago exurgit, in sinum intra cartilaginosa alarum protuberantiam conspicuum se exonerat. Non difficulter in

adſpectum producitur, ſive oſtia qværas, ſive fontes; hos enim cum ipſo progreſſu ut oculis ſubjicias, effringenda tibi narium oſſa, intacta manente, qva ſuccinguntur, tunica, & ſimul ſuo ſe ſplendore per tunicæ exteriora decurrens lymphaticum prodeſt; qvò ſi ſurſum continuaveris, elegantem ramulorum ſobolem radicum munere fungentem deprehendes. Sin oſtium deſideras, primo circa globum naſi reſecanda eſt alarum alterutra, hinc ſupra cartilaginofam excreſcentiam (in cujus inferiori loco oſtium, per qvò oculi ſe exonerant, hiat) eadem ala dividenda, illico enim qvendam qvaſi fulcum videbis, brevem illum, ſed immiſſum ſtylum in ipſum uſque vaſculum deducentem. Sæpius in ovibus totam extra ductum procurrentem foſſam nigredo, qva, ut hæc, ſic & omnia fere lymphaticorum excretiorum tum in buccis, tum ſub lingua, oſtia in iſdem non raro tincta obſervantur, vel obiter inſpicientibus velut intento digito demonſtrat. In canibus oſtium ejus non in ipſo cartilaginis dorſo, ſed inferiori loco ſe exonerat, nec ipſe canalis eandem a narium culmine in progreſſu ſuo diſtantiam ſervat.

Vifiſ, qvibus nares irrigantur, vaſis, inſpiciendæ ſunt viæ, qvibus idem, ubi munere ſuo functus eſt, humor, alio ablegatur. Sunt autem ex illo genere, qvæ hic examinari merentur, binæ, in utraque parte una. Nec enim hiantia naſi oſtia, qvæ reciproco aëris motui patent, huc referenda, cum foras ſpectantia huic muneri deſtinata non eſſe integer vitæ ſtatus, qvò nunquam qvòqvam hac excernitur, demonſtret; qvæ vero introrſum vergentia faucibus imminent, præterquam qvò magnitudo & uſus omnibus nota reddiderit, ut adeoque ſupervacuum ſit ea hic deſcribere, etiam ipſe ſitus huic muneri non ſufficientes manifeſte convincat. A naribus itaqve in palatum qvi patet, tranſitus brevis admodum eſt, nec canalis, ſed foraminis nomine dignandus. Locum ſi qværis, in extremo naſo offendeſ, ubi ſupra tertii maxillæ oſſis ſupercilium exſurgens cartilago allabentem humorem, ne extrorſum profluat, remoratur. Hoc intra repagulum in homine ad vomeris latera proxime invenies foramen rotundum, qvò licet ſuperiori ambitu ſatis ſit amplum, mox tamen arctatur adeo, ut ne ſetæ qvidem in palatum tranſitum concedat. Qvò ſi palati cœlum inſpexeris, in homine qvidem, ut & in canibus, ad anteriorum dentium radicem tuberculum exſurgere videbis, ad cujus latera, modo tantillum preſſeris tunicam, gutta utrinque una proſiliens oris cum naribus commercium manifeſtabit.

In bubulo autem, ut & ovillo, quibus in superiori oris parte primores denegati, eundem meatum cordis figura quærentibus indicabit, latera enim cordis illius immisso stylo in nares viam aperient. Observandum autem, in duobus hisce subjectis situ variare illam cordis figuram, & mucronem ejus in ovibus fauces respicere, cum in bubus eo basis dirigatur. Sed nec in diversis craniis eadem est meatus hujus conformatio; in homine enim, quæ ab intermedio vomere in narium cavo divisa conspiciuntur foramina & parva, si maxillam invertas, infra dentes in unum confluisse deprehendes. In brutis autem manent divisa, nec rotunda sunt, sed in oblongas rimas extensa.

Visis itaque, quibus nares accipiunt humorem, acceptumque iterum dimittunt, viis, ulterius pergendum esset, & inquirendum, tum in humoris ipsius naturam, tum in vasa materiam ejus advehentia, tum in modum, quo a sanguinearum partium amplexu liberetur. Sed cum in præcedentibus hæc utcumque sint examinata, specialior autem & ipsius humoris & modi secretionis cognitio plura requirat experimenta, in aliud ea tempus differam, donec & facultates meæ & tempus varia, quæ mente concepi, re ipsa permiserint experiri.

Ex illis, quæ tum hic, tum superius dicta, manifeste patet, quam studiose id egerit ingeniosissimus animalium Conditor, ne quæ fordes regiam sedem, caput puta, inquinarent. Humectandi erant cum aurium cavitate oculi, irrigandæ nares, os faucesque unctuofo humore oblinendæ: nihilominus nec oculi, nec nares, nec fauces, si naturæ convenienter vixeris, quicquam excernent. Quid enim lacrymæ, nisi moti animi signa? quid mucus narium, quid oris spatium, nisi vitæ a sanitatis legibus deficientis symbola? Κρατέει γὰρ τὰ στήθια τοὺς πόνους. Ubi munus suum implevit ille humor, ex auribus per aquæductum, ex oculis per collicias in nares derivatur, unde partim per ingentes hiatus in fauces, partim per angustum fretum in oris cavitatem dimittitur; & hinc per oesophagum in ventriculum descendens, & in vasa sanguinea per chyli lymphæque ductus viam affectans, peculiarem suo modo circuitum absolvit.





SUDORUM ORIGO
EX GLANDULIS. DE INSERTIONE
& VALVULA LACTEI THORACICI
& LYMPHATICORUM





THOMÆ BARTHOLINO

HAFNIAM

QUÆ a longo tempore tibi destinaveram, Celeberr. Vir, vix tandem elapso semestri, & quod excurrit, spatio, tuo se sistunt examinanda iudicio. Deceveram quidem a *Disputatione* illico de novo curare imprimenda, ut, quæ mutilata tum temporis proposueram, integra transmitterem: sed mox brevi per illustriores Belgii urbes excursionem avocatus, hinc variis hinc inde advolantibus impedimentis distractus, tandem ipsis sectionibus, dum nova quælibet observatio esset instrumentum sequentis, detentus, non potui rem ad umbilicum perducere; & nisi angusta domi res me retraxisset, in glandularum examine ulterius perrexissem, quippe desiderans omnium vasa perlustrare, & simul lymphæ in variis corporis nostri cavitatibus conspicuæ vias investigare. Non enim dubito, quin omnium, quas Clar. *Sylvius* conglomeratas nominat, glandularum munus sit, per peculiaria vasa vicinas humectare regiones. Sed & parum abest, quin credam, omnes humores aqueos in variis cavitatibus occurrentes iisdem a glandulis derivandos. Quid quod & sudor non aliam videatur originem agnoscere? Aliqvot enim in Nosocomio vicibus vidi in macilentis & diuturna morbi tyrannide omnino exhaustis cuti proxime substratas innumeras exiles glandulas tum in abdomine, tum aliis in locis per subtilissimas fibrillas, quæ pro vasis videntur habendæ, cuti connexas. Et paucis abhinc diebus cum Clarissimus *Sylvius*, qui hoc trimestri praxin exercendo docet, facultatem mihi daret, in subjecto, cuius ille iam tum partes

suo instituto inservientes demonstraverat, pro lubitu quævis examinandis, vidi, dissecta in cruribus admodum tumidis cute, glandulas, quæ alias vix conspici solent, adeo egregie conspicuas, ut genus earum, quo nempe referendæ, minime latere posset. Hæc itaque & alia glandularum præcipue ex pluribus frustulis compositarum naturam spectantia absolvissem lubens, adjunctis etiam illis, quæ, hæc dum ago, aliis in partibus una se mihi obtulerunt, non quidem nova, a multis tamen hodie in dubium vocata, si & tempus & curta suspellex id permisset. Nec enim subjecta facile adeo hic reperiuntur, nec editionem diutius protrahere ausus sum, quippe quæ fera valde prodit; & certe in te alloquendo sollicitum admodum me reddidisset cunctatio ista, nisi illa in aliis quidem rara, tibi vero familiarissima humanitas, quam ultimæ tuæ testabantur, novum mihi animum addidisset. Gaudeo, & me felicem prædico, cui te, tantum Virum, pia fata Præceptorem dederunt; & modo tibi placere possint, quæ a mea tenuitate sunt profecta, maximum me laboris fructum obtinuisse judicabo.

De variis, quæ tum in Theatris Anatomicis nobis visa, tum in ædibus Clariss. Dni van Horne inspecta, nihil addam, cum, a Clariss. Borrichio tibi illa significari, non dubitem. Scripsi, ni fallor, ultima vice de ductu thoracico quædam, in cujus insertionem investiganda non semel fui occupatus. Nuper autem observavi illius in vena cava ostiolum valvula satis magna & eleganti adversus regurgitantem sanguinem munitum, quæ eadem valvula etiam ductus lymphatici a collo descendens exitum claudebat. Immiseram primo per modum dictum lymphaticum setam in ipsam usque cavam, hinc & per ductum thoracicum in eandem axillarem viam tentans eo vix tandem penetravi. Cum itaque in ipsa cava versari setas deprehenderem, aperui illam, & simul in conspectum produxi bina ostiola sibi admodum vicina, & communi valvula tecta. Mirus autem lymphaticorum ad illam cavæ divaricationem confluxus, sed majorem ipse ductus thoracicus meretur admirationem, cum & immixtum stylum in cavam deducat, & si inde aberraveris, ad medium usque collum in descendente lymphatico ascendere permittat, cum tamen per idem lymphaticum etiam in sanguineum canalem via pateat ab istius ostio diversa.

Quod D. Blasium spectat, nunquam vel mentionem ejus fecissem, si ipse fraterque ejus amice me tractassent. Sed nec in thesibus ullum,

qvod motum animum arguere posset, verbum attuli, licet suis ille in litteris adeo acerbe mecum egerit, ut, si paria illi reponenda fuissent, Satyrici sales ad partes fuissent vocandi. Sed malui ego nudam rem suis rationibus munitam proponere, qvam ad verba inimica & dentata descendendo reverentiam, qvam Professori privatus debet, videri deposuisse.

Qvod me litterarum Fautoribus & in iis Magnifico Domino Cancellario commendatum reddere studeas, gratias ago habeoqve maximas, & cum nihil mihi sit, qvo prolixum hunc affectum tuum possim demereri, sanctissimo te Numini commendabo, & ardentibus apud illud instabo votis, ut cum novo anno nova integerrimæ felicitatis munera tibi largiatur, & faxit, serus in coelum redeas, & nobis diu lætus interfis. Qvo voto finio, &, ut tuo me favore amplius dignari pergas, obnixè rogo. Vale & festinanti calamo ignosce.

Dab. *Lugdun. Batav.* An. 1662, d. 9. Jan. ft. n.

Tibi

addict.

NICOLAUS STENONIS



CUR NICOTIANÆ PULVIS
OCULOS CLARIORES REDDAT.
DE LACTEA GELATINA
OBSERVATIO





CUR NICOTIANÆ PULVIS
OCULOS CLARIORIS REDDAT
DE LACTEÆ GELATINÆ
OBSERVATIO





THOMÆ BARTHOLINO

HAFNIAM

QVO majori me voluptate ultimæ tuæ bearunt litteræ, eo sollicitum magis reddiderunt, quæ a respondendo huc usque detinuerunt impedimenta; spero nihilo minus, conjunctissimum mihi *Matthiadem*, quæ nos inter fuit familiaritas, proxenetæ munere functurum, si quæ alias intercessione opus apud illum, cujus humanitas cum ejusdem eruditione toto orbe decantatissima de palma contendit. Discipuli scripta Collegis tuis, imo Regi nostro Clementissimo commendando, placuisse tibi eadem non verbis magis quam re ostendisti. Lætum me reddit non tam tua in me laudando facundia, quæ tenuitatis propriæ conscio ruborem incutit, quam propensus, unde amicissimum illud prodiit judicium, animus. Vera quidem a laudato laudari laus est, & quis te plures in Medicina laudis titulos meritis? Ego vero licet, a candore tuo fictum omne alienissimum esse, sciam, novi tamen, Præceptorum te consuetudini hac in parte morem gerere. Laudant illi discipulorum labores, non ut isto præconio dignos, sed quo animum illis addant, & ad altiora accendant. Sic licet, quæ omnibus admirationi est, tua in secando dexteritas facile videat, conatus meos & labores in re tenui & olim tantum non ab omnibus neglecta fuisse occupatos, ut tamen concepta semel spes alatur, tuis ad majora laudibus stimulantur. Sed & digna Cedro monumenta tua meo, quam Whartoniano, vasculo meliorem pollicentur fortunam; scilicet parum tibi videbatur nostris me hominibus laudasse, nisi & universo litterato orbi notum reddidisses

nomen meum. Ne vero summa tua benevolentia quicquam relinqueret intactum, etiam id egisti, ut de Clementia Regis securus essem. Sane, quotiescunque hæc omnia mente revolve, in contrarias partes divisus animus nescit, majoremne ex lætissimo hoc nuntio perceperit voluptatem, an ex imbecillitatis propriæ consideratione dolorem. Unicum tamen solatium mihi reliquum, quod sperem, quas meæ opis non est referre, grates cœlum relaturum, quod tot tua promerita summa gloria & omni felicitatis genere compensabit.

Quod D. Blasium spectat, ingenue profiteor, summa me tristitia affectum, cum ab hujus loci Professoribus audirem, quæ illis per Juniores Blasium a Seniore nuntiata; non causæ gratia, quandoquidem tot se mihi illico offerrent argumenta, ut vel accusatoris arbitrio electus iudex quicumque salva conscientia illam damnare non potuisset, sed ipsius nomine, quocum ea de re mihi certandum; adeoque, ut nihil naturæ meæ magis adversum quam stylum contra illum arripere, sic nec gratus quicquam erit, quam si tota res te arbitro posset componi. Norunt hoc illi, quibus mea contra D. Blasium nota argumenta, qui, me licet gravissime ab ipso apud Præceptores accusatum, licet amarulentissimis litteris provocatum, ex tanta argumentorum segete non nisi unicum ab ipsius scriptis mihi suppeditatum proposuisse, sæpius mirati sunt. Mihi vero nec mordaces ejus litteræ, nec convitiolorum plaustra tanti visa sunt, ut eorum nomine modestiæ limites transgrederer. Nec *Deusingii* opprobria moror, qui me modestiam docebit: scilicet illam ex prodromo ejus discam, ubi se non *Bilfiti* fautorem modo, sed & vitiorum convitiolorumque ejusdem imitatore manifestissime prodit.

De modo, quo Nicotianæ pulvis imbecillitatem visus emendat, multa meditari temporis angustia non permisit; aliis enim inserviendo, nobis, ut par est, non vacamus. Quod si autem in arena capiendum consilium, & quæ sub manu scribentis nascuntur, tuo sistenda conspectui, veniam dabis, si in quibusdam a vero transversum egerit præcipitantiæ. Cum caloris sit minutas & faciles motu partes, quæ data porta, diffundere, cumque, Nicotianam subtilissimis scatere particulis, manifestissimum sit, non dubito, quin impulsus in nasres pulveris vires una cum subtilissimis effluviis non modo per excretorios lymphæ ductus (qui in naribus ut copiosissimi, ita & brevissimi) conglomeratas glandulas tunicæ narium substratas subeundo sanguinem aggrediantur, crassosque in eo & viscidos humores incidendo ad

excretionem aptos reddant, sed & per continuum punctis lacrymalibus canalem furfum latæ palpebram inter oculique globum se infnuent, ibique, si non aliud peragant, saltem obductam corneæ visciditatem sensim fluidiorem reddant. Nec enim semper ea humoris palpebras interiorius oblinentis est limpiditas, quin aliquando immixtæ crassiores viscidioresque particulae tunicis oculi adhæreant, discussis tenuioribus: id quod beatæ memoriæ Parenti contigit sæpius, qui zingiberis radicem saliva humectatam oculis admovendo post uberem humoris effluxum brevi pristinam oculis aciem restituebat. Scilicet subtiles, acutæ & calidæ zingiberis particulae & membranas stimulo lacrymas provocabant, & crassum, qui membranis obductus erat, humorem incidendo attenuandoque liberiorem radiis aperiebant ingressum. Quid si quis opinaretur, tenuissimas medicamentorum istorum partes ipsam corneam penetrare, humoresque attenuando depurandoque transmittendis radiis aptiores reddere? Credidere multi, in fascinatione ex infecti corde adscendentes spiritus per ejusdem oculos una cum radiis in alterius oculos penetrare, sanguinique se jungere, adeoque similem ibi morbum producere, id quod in *Lilii Gyraldi Dialogis* me legisse existimo, ut alios, quorum nomina festinanti non succurrunt, silentio involvam. Quid quod & acutissimus *Cartesius*, per easdem membranas lacrymis exitum patere, in suo *De Homine Tractatu* voluerit? Quod si ergo hic lacrymis egredientibus, Veteres autem ingredientibus, noxiis spiritibus perviam putaverint corneam, non absolum esset subtilissimis medicamentorum particulis eandem ingrediendi facultatem tribuere; maxime cum nulla sit membrana adeo densa, quin infinitis fere poris sit pertusa. Mittam tamen hoc, cum nec illa de fascinatione sententia omnibus satisfaciât, nec *Cartesii* lacrymas explicandi modus, licet ingeniosissimus, detectis novis lacrymarum ex utraque oculi glandula prodeuntibus rivulis, ulla nitatur necessitate, nec membranæ, licet porosæ, subtilioribus quibuscumque recipiendis aptæ reperiantur. Suffecerit, Nicotianæ pulverem efficacissima sui parte tum per lymphæ ductus narium excretorios in sanguinem viam quærere, tum per τρημάτων continuationem ad exteriorem corneæ superficiem adscendere, cum ex hisce duobus res tota possit explicari; namque & cornea inde munda redditur, & per venas ad cor demissum medicamentum per arterias inde omnes in partes propulsum etiam ad interiora oculi deferitur, & per vasa tum sclerodem inter choroidemque delata, tum in fundo oculi ip-

ſoque retinæ centro conſpicua non ipſam membranæ pellucidæ ſubſtantiam modo puriorem reddit, ſed & contentos tunicis humores limpidos magis efficit. Et quid amplius ab iſto pulvere poterit deſiderari, quàm ut & tunicæ & humores depurentur, craſſa attenuentur, turbida clara fiant? Requiritur quidem & conveniens cryſtallini humoris figura ſitusque, & hiſce reſpondens pupillæ amplitudo pro lucis majore minoreve intentione varianda; ſed cryſtallini figuram vix medicamentum, facilius ætas mutabit; ſitus vero ejus pro vitrei copia ciliariumque motu varius eſt; foramen autem uveæ conſuetudini potius certa intuendi objecta quàm certorum medicamentorum viribus parebit. Sic minutiora legere, propius oculis objecta admoveſſe aſſveti remotiora non diſtingvunt; nautæ contra, remota ſemper proſpicientes, ſubtiliora repente oblata vix dignoſcent; hinc ferunt myopes, ſi iter facturi ſemper locum unde egreſſi reſpexerint, tandem naturæ vitium emendaturos. Scilicet muſculi naturam uvea æmulatur, quæ tamen radiorum lucis imperium potius quàm voſ luntatis ſequitur; quandoquidem & in me & in aliis obſervaverim, admota candela, vel radiis Solis admiſſis, conſtringi eam, nobis etiam reluctantibus. Sed quid hæc ego multis? Nempe diſcipulorum eſt, ſententiam ſuam Præceptorum judicio ſubmittere, ut, ſicubi Præceptorum rationes non fuerint aſſequuti, in viam reducantur. Idem mihi a te polliceor, Clariffime Vir, ut, ſi vel a vero aberravero, vel diſtincte parum hæc propoſuero, te monente, meliora ſeqvar. Antequam autem hæc miſſa fecero, pauca de re in propriis obſervata oculis ſubnectam. Meminit in *Peireſkii Vita Gaſſendus*, ipſum *Peireſkium* obſervaffe, oculos ſuos exceptas rerum imagines diutius aſſervare, maxime cum a ſomno, ut ille reſert, humeſcerent. Simile quid etiam mihi non ita pridem contigit, cum una cum Nobil. *Gerſtorpſiis* meis fallendi temporis ergo vitro utrinque convexo radios Solis colligendo imaginis varietatem pro vario vitri ſitu obſervarem. Suam namque oculis imaginem fortiter adeo impreſſerat igneus ille Solis diſcus, ut in obſcurius recedenti cubiculum & umbroſum parietem reſpicienti ipſiſſimus ille ignis in pariete rutilare videretur, ſenſim tamen evaneſcens. Nec unica tantum Solis in oculo relicta idea, ſed quot nobis ab inſpectione Solis in aëre volitare circuli videntur, tot ardentes notare licet globos, ſi uno evaneſcente alterum proſequutus fueris, donec ſe in pariete ſtiterit viſum egregie fallens flamma. Quod ſi vero luce illuſtratus fuerit paries, alii præter

rutilum apparebunt colores, non jam integrum orbem, sed exterior rem orbis limbum vel annulum referentes: existimarem, hic resili- entes ab illustrato pariete radios id agere, ne impressa ante idea distincte ita observaretur, ut solet alias, cum umbrosum, quippe nullos reflectentem radios, aut sane paucissimos, locum intuemur.

Sed vereor, ne nimis multa de oculo; addam duntaxat unam alteramve in abdomine canis non ita pridem secti oblatam mihi observationem. Venarum mesaraicarum trunci singuli circa intestina utrin- que proximo continuati liberum sanguini ex uno trunco in alterum dabant regressum, istaque venarum anastomosis vel potius continuatio perfecta in toto mesenterio conspiciebatur, ita tamen, ut ex istis intermediis ductibus suos intestina omnia rivulos acciperent. In eo- dem cane inter renes versus receptaculi finem albiissima se gelatina in anserini ovi magnitudinem accumulaverat, quam, detracta non- dum communi peritonæi tunica, chyli receptaculum esse, cum ad- miratione suspicabar; mox vero, cum nudata omnibus involucris materia non deflueret, agnovi errorem, remotoque glutinoso humore ipsum suo loco chyli receptaculum inveniebam.

Plura hisce adjungerem, nisi tum epistolæ limites transgredi, tum tua in tyrociniis meis relegendis patientia abuti viderer. Qvem des- ideras, libellum meum a *Matthiade* tibi jam tum oblatum spero una cum *Rolandi Sturmii* de Febrifugo pulvere tractatu. Vale Cla- rissime Vir, & favere perge

discipulo

Leidæ 21. Maji
An. 1662.

Tibi

addict.

NICOLAO STENONIS





OBSERVATIONES ANATOMICÆ
IN AVIBUS & CUNICULIS





THOMÆ BARTHOLINO

HAFNIAM

CUM pauculas meas luci publicæ exponerem observationes, decreveram, reposito in commodiora tempora cultro Anatomico, Geometricum radium tantum non abjectum resumere; ne omne oleum & operam perdidisse viderer, si omnino defererem studium, cui non paucas olim impendi horas, quodque non ut primum, sed ut unicum tractassem, nisi angusta domus utilia jucundis præferenda non tam svasisset, quam imperasset. Sed vix purgati sanguine digiti jucundissimo illo pulvere leviter erant perspersi, cum Virorum Clarissimorum partim minæ satis acerbæ, partim scripta parum amica meamque sententiam sensu non meo proponentia desideratam diu felicitatem mihi inviderent, & ut respondendi, sic quoque ad sangvinarium illud exercitium revertendi imponerent necessitatem.

De Clarissimo *Blasio* nostro nil dicam, qui cum ex illo tempore intra privatas se litteras continuerit, nec ego publice quicquam judicavi movendum; & spero, eandem illam humanitatem tuam, quæ te medium in illa causa promissit, etiam id effecturam, ne & ille animo tantillum forte commoto habenas laxans sibi ipsi obfutura sit propositurus (id quod ab illo privatim jam tum factum demonstrare possem, si scribendi desiderio flagrarem), et ego rem totam candidi lectoris oculis subjicere coactus bonas horas collocare tenerer in re famæ quidem innocentiam spectante, ad studia vero vel publica vel privata ne tantillum conferente. *Deusingius* vero noster quo fervore

Clariff. Dn. van Horne aggressus fit, qvibus me titulis ornaverit, rem tibi non ignotam existimo. Qvod si, ut in invehendo in alios facundia nemini cedit, sic in demonstrando de veritate cum Mathematicis certaret, omnibus, eadem cum illo non sequentibus castra, esset terrori; sed jam de telis ejus dicere licet, qvod olim de Jovis fulmine apud *Lucianum* Timon: οὕτω δαλόν τινα ἐπανατείνεσθαι δοκεῖς αὐτοῖς, ὥς πῦρ μὲν ἢ καπνὸν ἀπ' αὐτοῦ μὴ δεδιέναι, μόνον δὲ τοῦτο οἶεσθαι ἀπολαύσειν τοῦ τραύματος, ὅτι ἀναπλησθήσονται τῆς ἀσβόλου. Sane, nisi id agendum esset, ne aliorum silentium suam interpretaretur victoriam, paterer ipsum impune convitiari. Ut mysteriis plenissimus tandem impleretur numerus, accessit etiam *Antonius Everhardi*, Medicus Medioburgensis Clarissimus. Hic modestia reliquos superans, ut a convitiis abhorret, sic & abstinet a rationibus, non tamen ab experientia. Edidit paucos ante dies tractatum, cui hic est titulus: *Lux e Tenebris Affulsa, Ex Viscerum Monstrofi Partus Eucleatione*; in qvo post descriptionem monstri capite & pectore carentis primo, hepar velut inutile pondus a qvibusdam frustra proferibi, conqueritur, cum ejus eadem qvæ cordis sit necessitas (viderat qvippe in hoc monstro duo corcula hepatis tanqvam appendices ad utrumqve latus adjuncta), hinc me in scenam producit, &, dari vasa lactea succum lacteum in partium spermaticarum vulgo dictarum nutrimentum ablegantia, id qvod ego tum rationibus, tum experimentis impugnaveram, suorum se oculis demonstrasse, credit. Sed aut me oculi fallunt, aut Zeelandicis cuniculis dedit Natura, qvod Hollandicis denegavit. Aperui seniorum cuniculorum abdomina, juniorum extra inspexi, foetarum & ubera examinavi & uterum, sed necdum licuit mihi esse tam oculato, ut alias præter mesentericas & thoracicam, qvæqve ex mammarum glandulis ortæ ad papillam lac deferunt, observarem lacteas; sed nec in iisdem frustra unqvam vel in hepate, vel in collo, vel infra capsulam, vel in ingvinibus lympham qvæsi, testibus Viris Clarissimis *Sylvio* & *Borrichio*, qvi sua sectiones meas præsentia fere semper ornarunt. Non ita pridem, qvæ infra receptaculum decurrunt, vasa omnia uno vinculo constrinxi, ratus fore, ut, si ulla vasa lactea ibi essent, suo se proderent indicio; sed a ligatura illico, qvæ quid vinculum inter & capsulam erat, evanuit, cum ultra vinculum magnus vasorum numerus in majorem molem magis magisque sensim attolleretur præter limpidiissimam lympham nihil omnino continens

tium. Sed de re a prima lymphaticorum inventione tibi notissima plura si adderem, inepti nomen nulla ratione possem evitare.

Cum itaque hoc, ut vides, Excellentissime Vir, modo Clarissimorum Virorum partim privatae litterae, partim publica scripta ad Anatomica me exercitia iterum retraxissent, ne frequens ejusdem rei indagatio fastidium pareret, in varietate delectationem judicavi querendam: quo fine cum varia ad partes vocarem animalia, in corvo aquatico, *stolfer* vocant Belgae, quaedam vidi in aliis animalibus mihi necdum observata. Prae caeteris mirabar elegantes admodum vasorum biliariorum pancreaticorumque in intestina insertiones; namque & bilis per duos distinctos ductus, quorum alter a vesicula, ab hepate alter oriundus, in intestina se effundebat, & pancreaticus succus per totidem canales medio inter praedictos ductus loco egrediebatur, ita ut pancreatici ductus a se mutuo digitorum distarent, & ab illis utrinque bilarii ad sesquiditi distantiam essent remoti: omnia vero quatuor ostia pylorum respiciebant, quem inter & proximum fellis canalem interseptum spatium spithamam excedebat. Gratum hoc spectaculum ad aliarum avium viscera examinanda me invitavit: & ecce casu se mihi offerentem anatem, cujus intestina totidem quidem tum bilarios, tum pancreaticos excipiunt ductus, orificiis tamen minime & ut in priori distinctos; omnibus quippe quatuor ductibus unus idemque in intestina est ingressus, & ut per pancreaticos inserti styli pylorum respiciunt, sic per bilarios demissi contrarium obtinent situm, ut adeoque in ipso exitu se interfecantes setae crucis formam imitentur. In canibus vidi, ex eodem pancreate duos ad intestina ferri ductus, nondum tamen, nisi unica via bilem eo deferri, observare licuit. Piae memoriae Parens Clarissimi Viri meminit in *Anatomicis Institutionibus*, communem ductum aliquando bifidum reperiunt, ubi tamen, diversae fuerit utriusque origo an eadem, non additur. Sed ut ad corvum nostrum redeamus: vesicula fellis non accumbat hepati, sed per mediam pinguedinem ad trium fere digitorum latitudinem extensa venae portae truncum & situ &, obiter inspecta, etiam colore referebat, amplitudine vero major, utpote auriculari meo crassitie non cedens. Qua hepati jungebatur, tres ejus observabantur ramuli, unus, qui in hepar ascendens infinitos emittebat furculos; alter minor & transversim versus hepaticum tendens; tertius, ante nominatus, intestina versus descendens. Inflata vesicula in intestinale ductum vento via patuit; alia non licuit in

hoc subjecto penetrare, an quod nullis in hepar vel hepaticum pateret ingressus, valvulæ viam præcludentibus, an quod bilis crassior mæatus obstruxisset.

Hæc aliæque examinantes ad elegantius spectaculum langvescens cordis motus invitavit. Erat enim huic pullo cor adeo vegetum, ut micationes ejus ad secundam usque ab apertione horam ne tantillum quidem vel a celeritate sua, vel a robore remitterent, ut adeoque, ne otiosi essemus spectatores, non modo prædicta bilis vascula interea observaverimus, sed & varia alia, ut membranas diaphragmatis munere ex *Harvæi* sententia fungentes, renes cum suis ureteribus ureterumque egressu, ventriculi figuram, situm, tubulos circa sinistrum orificium plurimos, jucundissimam ventriculi superficiei interiori adhærentem viriditatem, & quæ alia in abdomine contenta nec temporis, nec chartæ angusta spatia modo recensere patiuntur, quæque præterea in aliis tibi subjectis sæpius visa. Corde itaque jam tandem deficiente, ut eo oculos mentemque verteremus, author erat Clarissimus *Sylvius* (accesserat ille cum Celeberrimo *Pisone*, & Medico Gedanensi Clarissimo Dn. *Gottwaldo*, licet Dominum *Pisonem* urgentia quædam negotia Amstelodamum revocantia non diu mihi Summi Viri præsentiam indulserint), qui sæpius a se in canibus observatum dixit, non cor, sed proximam cordi cavæ partem ultimo mori: cujus observationis veritatem etiam nostra hæc avis confirmavit. Corde namque rarius micante, & auriculæ patuit motus, & cavæ a motu cordis manifestissime distinctus, qui corde jam omnino emortuo ad duodecimam usque meridianam (hora enim nona matutina aperiēbatur pectus) continuavit in ramo cavæ descendente, quæ cordi jungitur, & auriculæ parte, quæ cavæ proxima; sed &, auricula munus suum tandem intermittente, sola cava etiam post secundam pomeridianam visa est moveri, & resecto dextro cordis ventriculo, omniqve, qui hepar inter & cor in cava erat, sanguine exhausto, videbatur nihilominus in concidentibus in se cavæ tunicis fibrarum transverfarum unius alteram excipientis intumescencia superiora versus ascendens. (Dissecto hinc corde in dextro ventriculo præfixam auriculæ valvulam vidi unicam tantum, eamque carnosam, qualem etiam in gallina inde observavi.) Idem in aliis inde subjectis quæsitum, sed successu non eodem. Namque cavæ quidem motum omnium esse postremum, in quatuor, quos inde secui, cuniculis observavi, fibrarum autem cavæ motum in eorum nullo

notare contigit. Sed & hoc cuniculis peculiare, quod, ut aviculæ cava quæ ramum descendente pulsat, sic in illis foli ascendentes rami se per intervalla constringerent. Ascendentium autem sinister in cuniculis a cava proxime supra auriculam exit, & hinc transversim ad basin cordis sinistrorsum latus tandem recta ascendit: atque ita ad auriculam dextram tres cavæ rami conflunt, descendens puta & ascendentium uterque, aut si secundum sanguinis motum describenda vasa, descendentium uterque cum ascendente, qui tantum unicus. Primus eorum, in quibus primum movens quævis, hæc tantum exhibuit: deficiente cum corde auricula quinqvies, sæpe sexies pulsabat cava, antequam vel semel auricula micaret; educto sanguine cessarunt omnia.

Paucis inde diebus alter in scenam protractus cuniculus, in quo, remittente tantillum auriculæ dextræ reciprocatione, distinctius cavæ, tum dextro, tum sinistro in ramo, motus conspiciebatur, qui tunicis licet ad tactum frigidis nihilominus continuavit, nec resecto cordis mucrone cessavit, sed novo sanguine, post priorem exhaustum, ex hepate propulso de novo sibi restitutus non minori ac ante vinctas per intervalla stringebat: etiam ad tertiam a sectione incepta horam, cum post ligatum cavæ truncum ascendente, expressumque omnem sanguinem, latera vasorum sibi mutuo incumbere otiosa, resecto iterum vinculo iterum pristinus rediit motus.

Quæ in tertio cuniculo nobis visa, distinctius observabantur: in auriculæ limbo motus notabantur contrarii, modo enim ab inferiori angulo superiore versus movebatur, modo contrario ritu a superiori versus inferiorem quasi repere quid conspiciebatur; cumque limbus jam plane esset emortuus, videbatur nihilominus in medio quasi plano fibra quædam sua contractione vitæ indicia edere. Non hic apicem cordis, ut in priori, resecui; sed per exiguum admodum foramen, vix aciculæ caput admittens, cum ramis cavæ, tam ascendentibus, quam descendenti, vincula injecissem, sanguinem eduxi, & illico quievire omnia; sed cum illæsa cordis vascula novum suppeditarent, brevi rediit motus, licet satis exiguus, qui tamen solutis omnibus vinculis momento quasi invaluit. Circa vespertinam sextam aperueram animal, & nihilominus post horam meridianam nonam micabat cava, quæ interea temporis sæpius, ob repetitas ligaturas, non paucas micationes intermiserat; & jam ultimo vincula remota veram, cum manifeste admodum & distincte viderem in ipso angulo,

qvo loco cum ramo cavæ inferiori superiores concurrunt, tunicam qvasi momento in arctum contrahi, & post secundum qvemlibet hujus anguli ictum ipsos ramos adscendentes moveri.

In quarto nihil a reliquis diversum notavi, qvod cordis aut cavæ motum spectaret.

Et hæc sunt, Clarissime Vir, quæ mihi de parte ultimo omnium movente licuit observare: de causa motuum horum modoque necdum vel cogitare ausus sum, cum, qvod rei istius difficultas exigit, tempus alia negotia mihi invideant, &, rem viribus meis majorem esse, ingenii imbecillitas pervadeat. Qvod si placeret humanitati tuæ summi & divini sui judicii sententia me informare, maximus pristinis tuis in me beneficiis accederet cumulus.

Prodiit hisce diebus *Cartesii Tractatus de Homine* una cum figuris a *Florentio Schuylio*, inclytæ urbis Sylvæ Ducis Senatore, & ibidem Philosophiæ Professore, editus, in qvo figuræ conspiciuntur non inelegantes, quas ex ingenioso cerebro prodiisse certum est; an vero tales in ullo cerebro conspiciendæ, valde dubitarem. Sed nimis diu Clarissimum Virum detineo: cujus tempus gravioribus curis sacrum. Vale itaque, Clarissime Vir, & favere perge

Tibi addicto

Dabam *Lugd. Batav.*
An. 1662. 26. Aug.

discip.

NICOLAO STENONIS



EX VARIORUM ANIMALIUM
SECTIONIBUS HINC INDE
FACTIS EXCERPTÆ OB-
SERVATIONES CIRCA
MOTUM CORDIS AU-
RICULARUMQVE
& VENÆ CAVÆ





1.

IN fele, cum peristalticus intestinorum motus vasorumque biliariorum multi magnique tumores diutius nos in sui examine detinuissent, ad cor revertentes quæta omnia invenimus; sed vix ter quaterve digitis compresseram, cum illico & cordi suus & cavæ rediret motus, licet rarus admodum, sed simul & admodum distinctus, adeo quidem, ut manifeste pateret, in cava motum, a parte tum superiore tum inferiore incipientem, circa cor definire.

2. In cane dum flatum ex arteria cœliaca in lymphatica hepatis deducere frustra conor, moritur animal: mox aperiendo pectus cor flatu admodum turgens a pericardio libero, & simul rediisse motum video.

3. Ad eundem finem præsentibus amicis aperueram hora quarta pomeridiana canem, ubi, cum in lympa eandem expertus fortunam re infecta eos dimissem, & ab aliis amicis detentus hora sexta redirem ad cadaver, cordis ventriculos admodum distentos vidi, quos digitis tantillum agitando, moveri auriculam, simulque vicinam auriculæ cordis partem manifeste contrahi, observavi. Sed quod maxime mirabar, ad subjectum hora octava a cœna redux tumidum semel tangendo, sæpius pulsare auriculam manifesto deprehendi, id quod ad horam usque nonam repetitis vicibus eodem semper modo observavi.

4. In alio cane vidimus modo quintam, modo septimam quamvis auriculæ micationem unum cordis motum excipere, circa arteriæ pulmonalis cum corde connexionem; in ipso exortu post quamlibet

cordis contractionem oriebatur tunicae extra carnem cordis protuberantia; quiescens cor, cum pungeretur circa dextrum ventriculū, micabat illico, immotum manens, utcumque alio in loco vellicaretur.

5. In cane vidi exsectum cordis mucronem digitis impositum, sive ungue, sive cultro vellicaretur, confringere se, ita quidem ut in se retractis lateribus digito decideret, sed & mucronem eundem invertendo vidi itidem moveri.

6. Foetum canis, postquam e membranis exsectus aërem ante aetatem haustum repetitis cum ejulatibus saepius exspirasset, aperto demum pectore, digitis impositum ita intorquebam, ut & cordis pateret motus & arteriae ductus: vidiqve tenellum cor & transparens, cum a basi recessisset mucro, rubere, cum ad basin accederet mucro, carnis exsuccae instar albere, vicina arteria sanguinem non tumore tantum, sed & colore manifestante, qui ob factum in vicinia vulnus illico effluxit. Initio ad quemlibet auriculae ictum bis micabat cor, sed inde non nisi secundum quemlibet auriculae pulsū unicus cordis motus excipiebat. Exsectum inde cor, & manuum calore fotum, etiam si vices & ultra ab omni latere acu transfoderem, suum nihilominus ad longum tempus continuavit motum.

7. In cuniculis antequam ad motum progrediar, de ductu vasorum, quorum saepius futura mentio est, sciendum: cavae ramos tres esse, inferiorem unum diaphragma penetrantem; superiores duos, alterum recta in dextro latere adscendentem, alterum, qui a dextro trunco juxta basin cordis transversim sinistrorsum fertur, inde in sinistro latere adfurgentem. His praemissis, quae motum spectabant, fuere sequentia. Corde cum auriculis quiescente vidi cavam superiorem motum suum continuare, etiam rescisso cordis mucrone, etiam exhausto, qui in illa erat, sanguine, modo novus succederet, etiam frigidis ad tactum omnibus, jam tertia post ceptam sectionem hora, sed &, antequam obrigesceret cor, observavi varium in illo motum, prout digitis varie comprimeretur.

8. In alio vidi cavae partem auriculae annexam interdum quiescere, non raro sexies pulsare, antequam vel semel moveretur auricula.

9. In cuniculo femina, praesentibus Clarissimis Viris Dn. Sylvio & Dn. van Horne, circa An. 1662 mense August. dissecta, varia, praesertim auricularum & cavae motum spectantia, fuere observata. Parcius & lentius micante dextra auricula patuit tandem motus cavae & in dextro & in sinistro ramo, ubi post binas tresve cavae pulsae

tiones semel movebatur auricula, modo tamen non semper eodem; interdum enim in limbo auriculæ ab inferiori angulo versus superiorem serpebat motus, interdum contraria plane ratione a superiore angulo ad inferiorem idem limbus videbatur concuti, nonnunquam limbo plano quiescente in medio quasi plano auriculæ quædam erat contractio. (Etiam in corde columbæ vidi motum ab uno auriculæ angulo incipientem ad oppositum pergere.) Ligatis dein tribus cavæ ramis, & omni, qui ligaturam intra in cava auriculaque & dextro ventriculo erat, sanguine educto per foramen exiguum in fundo dextri ventriculi parvula acu factum, simul omnis cessavit motus, ut emortua omnia dixisses. Sed non diu duravit hæc quies, quandoquidem novus ex venis cordis egurgitans sanguis, cavæ in se collapsas tunicas tantillum distendens, novum, sed exiguum, nec nisi in sola cava conspicuum, motum produxerit, qui tamen, cum remota vincula liberum sanguini ad cor concessissent refluxum, & cavæ & auriculis restitutus est integer. Circa sextam vespertinam aperueram cuniculum, & post mediam nonam, cum ipsa etiam vivere desisset auricula, vixit adhuc cava: nec idem experimentum præsentibus aliis amicis repetenti successum denegavit. Educto enim per idem cordis vulnus sanguine iterum admissio, ad solitum rediit motus, & id quidem modo peculiari, namque in ipso angulo, ubi superiores cavæ rami cum inferiori concurrunt, & quidem præcipue in ejusdem anguli latere sinistro pulsus observabatur, ab omni reliquarum partium motu omnino distinctus: ad secundum quemlibet hujus anguli ictum semel ramus tum dexter, tum sinister movebatur. Sed & in dextro ramo jam languescere videbatur motus inde incipere, ubi pericardium perforat, & versus cor continuari.

10. In cuniculi fœtibus ex utero extractis notavi, cor post contractionem fieri longius, & si commodo situ teneatur, manifeste patere, cum longius sit, proprio pondere concidere; prout enim variis situm, ita versus diversa latera labitur. Corde ita collapsio primo pulsant auriculæ, inde momento quasi conus cordis anteriora versus sursum elevatur, dextra ventriculus intumescens brevior fit, totum cor ad contactum durius, & mox pulmonalis arteria visa intumescere. Refectus conus non pulsavit; resecto dextro pulsavit nihilominus sinister; resectis auriculis & arteriis, in manu pulsavit ipsum cor, cum vellicaretur; cum movetur auricula, præsertim sinistra, in medio ejus plano depressio manifesta est.

11. In corvo aqvatico juniore de arbore nobis præsentibus e nido suo excusso, cum circa secundam ab apertione horam inciperet languescere cordis motus, manifeste ab illo distingvi poterant ut auricularum ita & cavæ micationes: omnes tres motus etiam tempore a se invicem distincti; corde vero tandem quiescente pars auriculæ proxima venæ cavæ diu supervixit, donec &, auricula omnino immota, sola pulsaret cava infra cor, duos a se invicem plane distinctos exhibens motus, quorum alter in parte remotiore exterius conspiciebatur, alter interiori latere in parte cordi proxima; sed quod mirabar maxime, nec in alio inde subjecto licuit observare, id erat, quod, resecto cordis ventriculo dextro, omnique exhausto sanguine, permanferit nihilominus in ipsis venæ tunicis, jam penitus in se collapsis, motus, quo fibrarum transversarum una post alteram aliquantulum elevabatur, filum super venam transversim ductum referens, idque cor versus pergendo, qui motus secunda pomeridiana necdum cessaverat, cum tamen ante meridiem hora nona sectionem incepissem.

12. Gallinæ sectio, præter alia satis egregia, quædam etiam cordis motum spectantia exhibuit hoc loco non reticenda. Nam ut, quæ de cordis auricularumque motu satis sunt vulgaria, omittam, non modo cavæ tum inferioris uterque ramus, tum superioris ea pars, quæ ad basin cordis transversim dextrorsum fertur, diu movebatur quam distinctissime, sed &, quæ per ipsam cordis longitudinem a cono basin versus ferebantur, venæ tam clarum motus sui edebant indicium, ut etiam tunicæ concussio eo loco videretur incipere, quo conum versus radículas spargit, & inde ad basin usque cordis continuari.

13. Cor pulli, ex ovo septima die ab incubationis initio extracti, ab omnibus vasis liberatum diu in manu mea pulsabat, inde, mortui instar quiescens, oris anhelitu in vitam iterum revocabatur, id quod sæpius in eodem corde successit.

14. In alio pullo cum post diuturniorem in reliquis partibus moram ad cor tardius redirem, totum corpus calida manu fovendo, & simul cordi tepidum digitum admovendo, pristinum motum illi restitui. Inde iterum mortuum, dum ex hepate novum sanguinem eo propellerem, secundo in vitam revocavi. Similiter & alterius mortui jam cordi vitalem ignem fotu digiti restitui. Sed & junioris cuniculi emortuum cor digiti calore ad se reversum ultra centies sponte micare observavi.

Ex dictis colligitur:

1. Motum intermissum redire ad vellicationem, sive a re solida, ut acu, cultro, ungue, sive a sanguinis vel halitibus, vel dilatatione.
2. Motum non esse totius substantiæ, sed singularum fibrarum, nec tantum fibrarum integrarum, sed & utroque extremo carentium.
3. Fibras non toto ductu simul, sed sensim per partes contrahi, incipiendo ab uno extremo & versus alterum continuando, id quod & in peristaltico intestinorum motu conspicitur.

Possent inde & alia concludi, quæ fusius exponentur, si Deus me patietur absolvere, quæ de corde olim cœperam. Licebit interea aliis experiri, quantum dabitur progredi in motus animalis modo & causa investigandis. Mihi validissimum argumentum ad humani ingenii arrogantiam conculcandam porrigit: 1. quod hactenus tot seculorum labore & speculatione nihil circa motus animalis veram causam & modum detexerunt philosophi, 2. quod, qui de illa materia sententiam suam magna cum autoritate pronuntiaverunt, omnes falsa nobis dogmata pro demonstrationibus venditarunt. Absit, plenam omnium expositionem promitterem: Deo tamen gratiæ debentur, qui saltem errantium falsitatem omnibus evidentem reddidit. Prudenter olim ille:

*Virtus est vitium fugere, & sapientia prima
Stultitia caruisse.*



DE VESICULIS IN PULMONE.
ANATOME CUNICULI PRÆG-
NANTIS. IN PULMONIBUS
EXPERIMENTA. DE LAC-
TEIS MAMMARUM. IN
CYGNO OBSERVA-
TIONES, &C.





THOMÆ BARTHOLINO

HAFNIAM

SI unquam ulla, præsens certe scriptionis celeritati juncta responsionis tarditas excusatione opus habet: cum & binis licet eodem tempore beatus litteris, nullas tot mensium decursu remissem, & modo, cum respondendi officium differre amplius non liceat, temporis invidiam argumentorum copia experiatur. Sed facilem utrique veniam nulli non decantata facilitas tua promittit.

De pulmonum parenchyma spectantibus *Malpighii* observationibus ulteriorem meditandi occasionem desideratum diu tandem vero mihi ab amico oblatum microscopium præbuit. Lectis quidem tuis tum ad *D. Borrichium*, tum ad me litteris, non dubitavi, quin variæ in pulmonibus demonstrari possint vesicæ, & quidem modo non uno. In exsiccatis enim, si prius *Malpighii* exemplo omnis eluatur sanguis, quam exponuntur siccandi, plurimas, ubi dissecti fuerint lobi, conspiciendas cavitates sine omni controversia est: dissecantur enim simul plurimi, tum venæ, tum utriusque arteriæ, ramuli, quos omnes manifestis cavitatibus donatos nulli non manifestum. Quod si vero etiam, antequam siccantur, aëre pulmonum distendantur bronchia, quot quantasque in dissectis videre licebit cavernulas? Sane cum arteriæ asperæ extremitates sine numero per totam pulmonum substantiam dispergantur, flatu easdem violenter distendente, innumerarum vesicularum, si dividantur, speciem exhibebunt. Sed ideo statuendum, pulmonum parenchyma ex puris vesiculis constare, non videtur necessarium. Quid quod ne quidem inde sequatur, vel solius

asperæ arteriæ extremitates in vesiculas definire, ut de extremitatibus venæ, arteriæ, lymphaticorum nihil addam. Quantum in arido canis pulmone microscopium mihi revelavit, præter rotunda diffectorum vasorum foramina & minutissimorum filamentorum sine lege currentes myriades, nihil omnino conspiciebatur, nullæ rotundæ membrana undiqve vestitæ cavernulæ, nihil plane vesiculæ nomine salutandum. Nec ipsa ficcati pulmonis illæsa superficies vesicularum sub microscopio ulla exhibuit indicia; aderant protuberantiæ, sed illæ, ut magnæ, ita & inæquales, nec in medio tumentes, nec in ambitu orbiculares, adeoque vesicularum nomen minime tuentes. Absit tamen, ideo ingeniosissimi Viri experimento fidem detraherem, quod mihi semel iterumve idem tentanti non successerit, viam forte non eandem ingredienti. Sed de *Malpighio* hæc sufficiant, donec ipsas ejus *Litteras* examinare licebit.

Ipse his diebus cuniculum aperiendo, cætera ut in commodiorem locum remittam, circa foetuum (quos utero gestabat quatuor) pulmones sequentia observavi: Relicto suas intra membranas in utero quarto foetu, reliquos tres extractos ab involventibus tunicis liberavi, unius etiam ligavi umbilicum, & ecce post brevem moram moventes os pectusque catulos & tandem aërem magna vi haurientes, ut plenam respirationem omnes facile possent agnoscere, inde pedum vires ipsi tentando, post paucos nifus eo usque invaluerunt, ut eorum unus, hinc inde perreptando, tandem sub expansæ per mensam matris cruribus, ab aëris frigore minus ibi vellicatus, quiesceret. Extraxi ex tepido suo asylo vegetum animal, & pro viribus satis reluctantis pectore dissecto pulmones reperi albicantes jam tum & spongiosos, licet alterius intra membranas suas in utero exstincti pulmones densi, sanguinolenti & his omnino essent dissimiles, miratus, tantam tam brevi tempore factam mutationem. Superiori ætate in cane gravida circa respirationem idem observavi, ad pulmones tum temporis non attendendo, ubi foetus, licet necdum partus tempus instaret, exacti vitalique auræ expositi haustum aërem cum repetitis ejulatibus reddiderunt. Sed hæc frequentia; rarum quod ingeniosissimus juvenis & in Anatomicis exercitiis assiduus Dominus *Swamerdamius* mihi exhibuit, aërem per medios pulmones in cor propellens. Deficiente animalis vita, vesica quadam reciprocum pulmonum motum respirationis æmulum continuat, donec tandem per venæ pulmonalis ramos in cor descendentes bullæ experimenti successum

demonstrent. Memoratu quoque dignum videtur, quod apud eundem ut & inde apud Dn. *Padbrugium*, juvenem itidem Anatomica magno cum fervore tractantem, circa motum cavæ notavi, ab ingeniosissimo Dn. *Lahr* primo observatum. Viderunt hi, si in vivo denudetur jugularis vena, ut & per medium dorsum in abdomine decurrens cava, quotiescunque inspirando thoracem distenderit animal, evacuari & in collo & in abdomine cavam, ita ut, quæ ante distenta rubebat, momento compressis tunicis albicet, ad pristinam & rotunditatem & purpuram illico reditura. Qvi id videre hactenus, varie varias attulere rationes; mihi talem res visa est admittere posse explicationem, si vacui fugam ad partes vocare liceret. Si enim, ut ajunt, thoracis dilatatione distentus pulmo aërem fugit, quasi, & attrahit, posset dici, propter eandem thoracis ampliationem dilatam, quæ intra thoracem est, cavæ portionem attrahere illum sanguinem, qvi in cavæ ramis tam supra, quam infra thoracem reperitur, ideoque inaniri cavam extra thoracem, quod, quæ intra thoracem est, cava impleatur. Sed cum vacui fuga fere in totum devicta in vacuum aufugisse videatur, vereor, mihi illorum apparet mens, qvi per solam pulsionem similia phænomena exponere solent, atque secundum hæc dogmata, thorax dum musculorum ope dilatatus circumstantia quælibet eo pellit, ubi minor est resistentia, uno eodemque tempore & in pulmones aërem, & inferiora versus abdominis viscera, & in partem cavæ intra thoracem, qvi in cava extra thoracem est, sanguinem propellit, ut adeoque impleatur cava intra thoracem, quod, quæ extra est, suum eo mittat contentum. Hoc forte modo illud phænomenon explicari posset, si ulterior experientia idem confirmarit, simulque pateret ulterior respirationis in circulatione sanguinis usus. Sed quo me pulmones, quo respiratio abduxerunt? Ad reliqua doctissimarum tuarum momenta redeundum.

Lactæas quasdam ad mammillas ab interioribus tendere, multæ quidem indicare voluerunt observationes, sed, quantum ego colligere possum, necdum ulla demonstravit. Sane *Schenckium* nil vidisse nisi vasculum in ipsis mammarum glandulis ortum, & inde ad papillam delatum, ipse quam evidentissime testatur, dum vasculi ejusdem pressu lac per papillam effluxisse fatetur. Nec enim facile crederem, si quæ ab interioribus prodirent vascula, eadem ad papillam immediate esse continuanda, cum inde sequeretur, & frustra esse datum illis glandulosum parenchyma, & in sectionibus non separari posse ubera

lacte diftenta fine vasculorum eorundem diffecione, adeoque nec fine effufione lactis, quorum huic experientia reclamat, illi fidem denegat ratio. Qvod fi vero ftatuendum, lactearum duo efle genera, unum ab interioribus ad glandulas adfcendens, alterum ab iifdem glandulis per proprias radices receptum lac ad papillas deferens; non poterit idem Clariffimus Vir ex fuo experimento demonftrare, primi generis fuiſſe, qvod vidit, lacteum, qvod tamen ſolum eſt, de qvo qværitur, cum ſecundi generis lacteæ, qvæ nempe contentum ſuum extra corpus excernunt, a nemine facile in dubium vocentur. Qvod reliquorum attinet obſervationes, obſcurant illæ rem, non illuſtrant, cum pro authorum varietate varians iſtorum ductuum deſcriptio experimenti fidem dubiam reddat, &, qvæ qvilibet mentis oculis primo vidit, eadem & corporis inde oculis ſe vidiſſe crediderit. Hic enim a ductu thoracico per thoracis muſculos ad ubera, ille a receptaculo per abdomen ſupra abdominis muſculos eodem, alius ad eandem partem per abdominis muſculos ab utero lactea deducit, & nihilominus experientiam teſtem omnes producant. Sed qvid, ſi in canibus hic, in cuniculis ille, tertius in homine, qvæ aſſert, viderit? Qvid, ſi in qvolibet horum triplex ad ubera repertiendus canalis? Hæ ſimilesqve ſuſpiciones locum forte invenirent, niſi varia ſe illis opponerent, veritatis ſpeciem longe majorem præ ſe ferentia argumenta. Sed hac de re plura, ſi Deo placuerit, in reſponſione ad *Everhardum*, in cujus gratiam, ut eadem obſervarem, ſumptibus non magis peperci, quam labori, cuniculorum omnem varietatem ad cultri examen revocans, ſed qvo plura hoc in caſu tento, eo lymphaticorum tuorum clarior refulget veritas.

De veſicula fellis, qvæ in corvo obſervata ſcripſi, paullo forte fuerunt obſcuriora, negavi qvippe, hepati accumbere, & tamen hepati jungi dixi. Ideo autem hæc duo putavi diverſa, qvod in reliquis, qvæ aperire mihi contigit, animalibus veſica non modo fibrillis quibuſdam hepati jungatur, ſed eidem media fere ſui parte accumbat, ſecundum longitudinem ejus ſuperficiæ communi qvadam pellicula connexa, hic vero unico tantum ramo hepati adhærens reliquo ſui corpore undiqve libera ſacculi inſtar oblongi ſe mihi exhibuerit videndam. Sed nec *M. A. Severini* obſervatio de vicino cordi hepate in omnibus corvis videtur locum inventura, cum in hoc, etiamſi parvo multisqve in locis adhuc implumi, auriculam dextram inter & hepar aliquot digitorum fuerit intervallum. Cordis motum, cujus

tum meminî, accuratius ut examinarem, tum varia, quæ aliud agentî quærentique se per intervalla obtulerunt, experimenta, tum aliæ quædam rationes occasionem dederunt: quo fine in fibras cordis diligentius inquisivi, de quibus, favente divina gratia, brevi tractatulum curabo edendum cum adjuncta responsione ad *Everhardi* rationes, & *Deusingii Blasii*que convitia, quorum ultimus amica tua interpositione seposita, quas ante biennium præter propter ad te dederat litteras, feris proximis Nativitatis Christi publicam in lucem emisit, ubi, ut taceam, quæ in me evomit, admodum amarulenta, circa ductus istius descriptionem *Ideæ*que *Med. Gen.* interpretationem sex & ultra committit Anatomicos errores, utpote qui ne quidem ex mea descriptione verum istius ductus vel ortum adhuc addiscere potuit, vel exitum.

Ad crebras alvi excretiones excedentem bilis copiam multum facere, non dubium est, minus certum, an ad easdem aliquid conferre possit vesiculæ biliaræ situs profundior; ut ut est, non in hac tantum, sed & in aliis avibus eundem fere vesiculæ situm, bilariosum vero ut & pancreaticorum vasorum numerum semper observavi eundem.

Quid in mure, glire, fele variisque boum uteris observatum, ab amicis, ut puto, jam tum audivisti, ut & de bile insipida, nec non de hernia uterina in utroque canis ingvine reperta.

Cygnus, quem hisce diebus aperui, varia exhibuit; præ cæteris mirabar, in utroque lingvæ latere tredecim præter propter numerari ostia in eadem recta linea sita, quæ singula & pressa succum emittébant, & styllum admotum satis recipiebant profunde; 2. totam ingluviem, sed & ingluviem supra œsophagum, innumera exhibere ostiola, unde nullo negotio succus exprimebatur, in ingluvie albicans, aqueus in œsophago; 3. in membranas pulmonum a costarum extremitatibus procurentes fibras carneas, diaphragmatis forte absentiam suppletentes; adderem cætera, nisi ab amicis, qui una aderant, crederem significata.

In humano cadavere Blasianos errores circa ductum salivæ superiorem hisce diebus detexi, sed &, quæ in oculis brutorum observata descripsi vasa, in ejusdem hominis oculis manifeste notavi, tum ex glandula oculi exteriori in tunicam palpebræ superioris interiorem pergentia, tum a punctis lacrymalibus patentia in nares; de glandula vero lacrymali dicta nihil licuit observare.

Equinum caput, ut alia varia satis egregia, sic & in cerebro quæ-

dam in aliis mihi non visa exhibuit, ut in ventriculo nobili plexum choroidi fimilem, in hoc ut & ipso choroide affusam vasis substantiam glandulis fimillimam; in pineali magnitudinem quidem satis conspicuam, sed colorem exterius nigricantem, interius cineritium multis fuscis maculis distinctum, usque adeo jam omnia audent omnes, ut ne ipsam quidem animæ sedem intactam relinqvat atra bilis. Sed eqvis forte id familiare; idem enim etiam in altero, quod inde fecui, eqvino capite deprehendi. Certe qvo plura tum aliorum animalium, tum varii generis avium aperio cerebra, eo minus animalibus convenire ingeniosissima & actionibus animalibus explicandis admodum alias conveniens cerebri animalium a Nobiliss. *Cartesio* excogitata fabrica videtur. Id quod aliarum rerum in cerebro observatarum expositione ostendere facile esset; nisi eadem observationes, cum maximam partem fuerint vespertinæ, nec raro nocturnæ, multum adhuc noctis in se haberent; nisi eadem, propter ordinarias occupationes interruptæ, multas multis in locis ostenderent lacunas; nisi denegatus mihi Pluti favor id egisset hactenus, ut ex iis, quæ plurima in eum sinem indies video agenda, paucissima præstiterim. Sed fovenda hæc sunt, donec otium & opes acerbos modo fructus ad maturitatem quandam perduxerint. Vale, Clarissime Vir, & favere perge

Tibi

addict.

Raptim *Leidæ* A. 1663.

discip.

5. Mart.

NICOLAO STENONIS



LYMPHATICORUM VARIETAS





IN canibus observata varietas circa lymphaticorum concursum cum vena cava in sinistro latere colli consistit tum in ramis insertionum, I, qui modo plures sunt, modo pauciores, tum in annulis, K, qui vel omnino desunt, vel adsunt quibusdam plures, aliis pauciores, interdum angusti, nonnunquam admodum ampli, ut figuras inspicientibus patet.

Fig. 1. debetur diligentiae amicissimi D. Swammerdamii, 2 & 3, parum distincte quia insertionem a me præparatæ, singularum peculiaris explicationes supervacuas judicavi, cum eadem communis omnium explicatio sufficiat:

Venæ cavæ, A, truncus supra cor.

B. *Ramus jugularis.*

C. *Axillaris ramus.*

D. *Ramus tendens in posteriora colli.*

E. *Ramus tendens in interiora colli.*

F. *Lymphatica colli.*

G. *Lymphatica sinistri pedis anterioris.*

H. *Lymphaticorum infra jugulum communis truncus, dictus Thoracicus.*

I. *Rami, quibus lymphatica continuantur cavæ.*

K. *Annuli lymphaticorum, per quos ut plurimum vel vasa vel nervi transeunt.*

L. *Lymphatica ab intestinis & hepate.*

M. *Lymphatica a lumbis & pedibus posterioribus.*

N. *Glandulæ conglobatæ.*

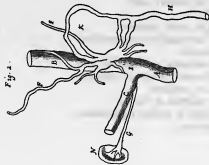


Fig. 2.

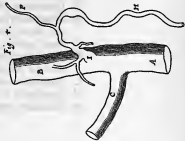
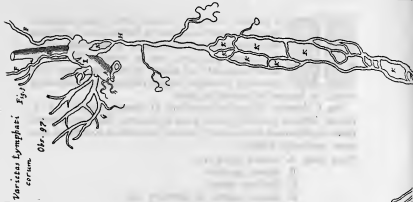


Fig. 3.



Varicosa lymphatica

corum

Obs. 97.

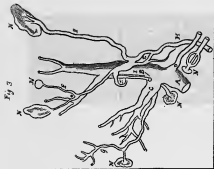


Fig. 5.

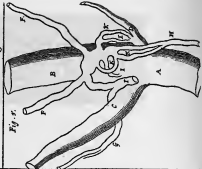
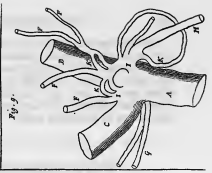
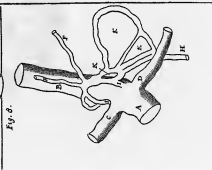
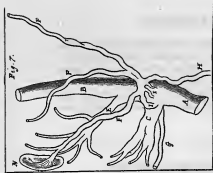
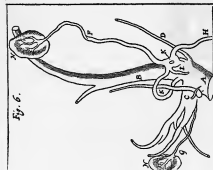


Fig. 6.



Cum ejusdem generis vasa in eadem specie animalium tam insignem in diversis individuís admittant varietatem, facile patet, omnium opificem Deum inter alia ex corpore animalium agnoscenda Divinitatis attributa etiam hæc duo voluisse nobis proponere, se scilicet nec casu ferri, cum a conformationis generalis regula non aberret, nec adstringi ulla necessitate, cum particulares conditiones pro arbitrio in individuís mutet.





APOLOGIÆ PRODRAMUS, QVO
DEMONSTRATUR, JUDICEM
BLASIANUM & REI ANA-
TOMICÆ IMPERITUM
ESSE, & AFFECTU-
UM SUORUM
SERVUM





VLTRAJECTI liber hisce diebus prodiit, cujus fronti hæc leguntur inscripta: *Novus Ductus Salivalis Blasianus in lucem protractus a Nicolao Hoboken*. Si præfationem consulis, pollicetur illa in hoc libro invenienda, quæ Candidum Lectorem edocere possint, certumque reddere inventionis primæ Ductus Salivalis non ita pridem ex maxilla superiore feliciter eruti; & id quidem ita, ut ex iisdem judicari possit, quo jure & animo nuper Nicolaus Stenonis sibi eam assumere & Blasio derogare conatus sit. Ipsum opus si adis, judicii quasi formam vides, ubi Blasius accusator, Ego reus, Hoboken iudex: parum enim fuerat Hobokio isti edidisse Blasii epistolam, nisi simul in hominem sibi ignotum censoriam strinxisset virgulam, & de re sibi æque ac Blasio cognita iudicium præcipitasset.

Blasius (id quod in ipsa Apologia verbis Blasii sum demonstraturus), se Achilli, me infelici puero comparando, accusat me furti, ingrati animi, injustitiæ, mali moris, erroris, nugarum, infidelitatis, inhumanitatis, mendacii, falsitatis, calumniæ, cavillationis, malitiæ, arrogantiae, perversitatis, audaciæ, inverecundiæ, impudentiæ, stultitiæ, improbitatis. En catalogum titulorum! Ecce honesta Blasii verba! Qvis hæc a Professore, imo quis ab ullo viro honesto in causa nondum probata expectasset?

Verba, in quibus hæsit animus Judicis nostri, damnant me, ut arrogantiae stimulis impulsus, ut mei immemorem, ut officii, gratitudinis reverentiæque amico, hospiti, imo Præceptori plusquam amicissimo debitorum jura infringentem & violentem, damnant conatus meos, ut tales, qui, licet exordio speciosissimi sint &c., tandem tamen, fucos larvaque

detractis, injuriæ factæ conscientiam pudoremque auctori, si ingenuus modo sit, creare solent; & ne relinqvat, quo adscendere possit ulterius, fallacem me Sinonem & Proditorem Anagrammate publice proclamat. Agnoscite hinc animum judicis ab omni affectu vacuum.

Ipsam controversiæ statum, unde hæc omnia promanarunt, si scire aves, hic est: *an in collegio privato aliave occasione Ductum Salivarem in Observationibus Anatomicis a me descriptum, aut ullam ejus partem Blasius mihi demonstraverit? Asserit Blasius, ejusque simplicem assertionem pro demonstratione admittens Hoboken sententiam suam pronuntiat. Hæc inde quæstio peperit aliam, sc. an Blasius, antequam ipsi demonstrarem, quicquam eo de ductu sciverit? imo an ullam distinctam ejus habuerit cognitionem, antequam meæ prodissent theses? Scilicet visum mihi, ut in Observationibus Anatomicis de Oris Glandulis th. 13. dixi, ductum quendam D. Blasio, cum in ædibus ejus viverem, ostendi, quo, quid esset, non significante, septimo inde mense Lugduni Clariss. Præceptores meos consului, numquid eundem ante vel ipsi observassent, vel ab aliis vidissent descriptum. Re perspecta & in homine etiam detecta publice eum primo in eo, quod Nosocomio adjacet, Theatro Clariss. Dn. Sylvius, inde itidem in magno Theatro Clariss. Dn. van Horne demonstrarunt, meum simul nomen, quæ illorum fuit humanitas, commendando. Audiens hoc Blasius integro fere ab inventione anno nominatis modo Præceptoribus meis Celeberrimis significat, se illum ductum & invenisse primo, & mihi demonstrasse; mox Medicinæ Generalis Ideam edit, in cujus præfatione eundem illum ductum a se inventum proclamat. Nempe Blasius, mihi ulteriorem peregrinationem meditati occasionem in ea inquirendi defuturam ratus, me Lugdunum digresso in collegiis suis ductus ejus, tanquam proprii inventi, fecerat mentionem (veram enim demonstrationem ab illo nunquam factam ductus Blasiani seu ductus salivaris imaginarii, demonstrabit descriptio, quin & facta nuper Muidæ ab eodem sectio, in qua eum frustra ab eodem quæsitum audio, evincit). Inde cum Lugduni hoc agi audiret, vel semet prodere, vel me tenebatur accusare, quorum illud pudor vetabat, huic reclamabat conscientia. Vicit tandem pudor, sed quam felici cum successu, exitus evincet. Ego, nihil minus quam hoc a Blasio expectans, licet & alia se offerrent, quibus contrarium potuisssem demonstrare, unico hoc tantum adversus illum usus sum argumento. Quod si Blasius integro a prima inventione anno in libro, quem*

Ampliffimis Reip. Amstelod. Consulibus & Thesaurariis Ordinariis dedicavit, in quo primum se ejus ductus inventorem publico indicat, in quo novi nihil præter eundem afferri profitetur, in quo Whartoniani ductus & ortum determinat & exitum, ductus, quem sibi vindicat, nec verum ortum determinat, nec exitum, imo glansdulam, unde oritur, usui alii ignobili destinat; non poterit dici ejusdem ductus ortum scire vel exitum, nedum ductum illum alteri demonstrasse, multo minus invenisse. Atqui *Blasius*, & c: Ergo. Hujus ego argumenti solam assumptionem in thesibus meis sumpsi probandam, missis omnibus aliis, quæ, *Blasium* inter & me gesta, pro me licuerat afferre. Hæc mea est malitia, hæc calumniæ, hæc improbitas, hæc proditio; hoc ego nomine a *Blasio* accusor, ab *Hoboken* damnor. Si vir est *Blasius*, probet ullo vero argumento, me contra se vel egisse quicquam, vel dixisse, quod non coram legitimo Magistratu paratus sim defendere: quod si vero res, quas afferro, cuiusquam forte videantur acerbiores, committenti eas, non enarranti, id adscribendum. Nisi conscius recti animus honestatem infra duceret a carentibus ratione dictariis turbari, talionis jure sua in utrumque retorquerem. Sed absit id agerem, ut rixantes inter aniculas in foro se versari crederent Lectores. Vindictam ego aliis, imo legitimo Magistratui, reservabo integram, contentum hic in mei defensionem quædam proposuisse, in ultionem nihil.

Si Judex noster utriusque consensu fuisset electus, aut saltem persona, quam sustinet Amstelodami *Blasius*, dignus, ostenderem hic illi, quænam ingentia illa fuerint beneficia, quæ plenis mihi buccis exprobare non erubescit *Blasius*; quid in commendatitiis litteris primis meo nomine a *Blasio* petierit *Bartholinus*; quibus me artibus *Blasius* sibi reddiderit hospitem; quæ in re habuerit discipulum; quæ solertia id egerit, ut, dum sub illo præter vulgares & nudas operationes Chymicas nihil discerem (jam tum enim integro, & quod excedit, triennio a Clariss. Viris D. *Simone Paulli*, Dn. *Th. Bartholino*, Dn. *Backmeijero* aliisque Medicinæ tum candidatis, tum studiosis ea in Anatomicis, ut taceam cætera, videram, quæ apud *Blasium* frustra quærerem), perderem interea occasionem discendi, quæ plurima Lugduni non in Medicina modo, sed & in aliis Medico necessariis artibus, licuisset a fine hyemis ad caniculares usque ferias, optimo scilicet totius anni tempore, addiscere a Viris toto Orbe ob experientiam suam & scientiam celebratis.

Hæc, inquam, omnia & singula Judici nostro quam evidentissime demonstrarem, simulque exponerem, cum tandem has *Blasii* artes penitus pervidissem, qua facilitate omnia tulerim, quam amice de *Blasio* semper fuerim locutus, etiam cum hæc in me moliri inciperet, idque omne in amicorum ipsius gratiam.

Inde ulterius pergerem, & 1. demonstrarem, *Blasio* ductus a me descripti notitiam nullam fuisse ante triennium ab II. Calend. Jul. Anni 1662. numerando, nec cum Amstelodamum accederem, nec cum *Medicinam General.* ederet, nec cum epistolam Dn. *Bartholino* scriberet, nec cum eandem superiori anno ad *Hoboken* transmitteret; 2. ex ipsa *Blasii* epistola luce meridiana clarius redderem, *Blasium* non intelligere, vel quid de maxillaribus & parotibus dicat *Whar-tonus*, vel quid ex eodem de iisdem ipse *Blasius* in *Medicina Generali* per compendium descripsit, vel quanti glandularum distinctio Sylviana sit momenti, vel quæ de salivaribus a me propofita, vel quid ipsa de iis doceat Anatomia.

Sed cum alium Professoria *Blasii* dignitas requirat Judicem, cum æquitatis legibus repugnare videatur ad illius tribunal causam deferre, qui nec rei, de qua agitur, peritiam ullam habet, nec suos frenare novit affectus, convenientiori hæc omnia loco & tempori reservabo.

Hic itaque ad Judicem nostrum reversus, licet parum amice, imo parum honeste ab illo exceptus, nihil in illo solam præter credulitatem accusabo, ut quem puto pervasum habuisse, ab amico nihil falsi expectandum, ab Anatomico tanta cum fiducia errores Anatomicos non potuisse proponi. Credulitatem vero, seu cœcum potius amici sui amorem, sequuta est, neglecto rei examine, sententiæ præcipitatio.

Si enim utriusque examinasset verba, simulque ad partes autopsiam vocasset, non dixisset, me mihi *Blasianum* adscripsisse ductum, non promississet Lectoribus ex ista *Blasii* epistola certitudinem inventionis ductus maxillaris exterioris, sed potius errores *Blasii* Anatomicos observasset, & manifestissima desiderati candoris *Blasiani* invenisset specimina.

DUCTUS SALIVARIS IMAGINARIUS, SEU DUCTUS VERE BLASIANUS, EX *BLASII* SCRIPTIS ERUTUS.

Oritur a maxillaribus internis (*Med. Gen.* p. 63.) seu eadem glandula, ex qua oritur inferior, sed non præcise ex uno loco (*Duct. Blas.* p. 31.). Per glandulas hæc non intelligit maxillares exteriores (*D. B.* p. 34.), nec quas parotidum nomine descripsit in *Med. Gen.*

(*D. B.* p. 39.), sed quæ a parotidibus usque ad mentum sese varia magnitudinis colorisque specie exhibent (*M. G.* p. 23.), seu quæ cum maxillari interna fit una & eadem, nec inde fecerni possit, nisi velimus unum quid in duas tresve partes dividere (*D. B.* p. 32.); quæ maxillis non incumbit, sed iisdem substrata est æque, imo magis, quam quidem maxillares internæ (*D. B.* p. 40.), cujus rudimenta quædam auriculam cingunt (ib.), quæque cavitatem sub auricula se exhibentem satis profundam replet (*D. B.* p. 52.).

Defert salivam ad glandulas oris anteriores, & ita quidem, ut inde motu lingvæ exprimi ea possit (*M. G.* p. 64., *D. B.* p. 45.), ibique esse non modo unum foramen amplum, & papillari excrescentia munitum, sed & alia magis inconspicua, quibus ab eodem ductu provenientes propagines gaudent (*D. B.* p. 37. & p. 48.). Foramen illud, ex supposito saltem, dentibus anticis minus vicinum esse foramine alterius ductus (*D. B.* p. 42.), ad eandem anteriores glandulas etiam a parotide Blasiana per vasa lymphatica salivam devehit suspicatur (*D. B.* p. 50.). In disputatione habita anno 1661. 8. Jul., quam citat *D. B.* p. 36., ait: inferiorem excurrere ad inferioris maxillæ extremitatem, circa menti inferiora, ad latus frenuli lingvæ, superiorem vero excurrere ad maxillæ superioris latus, non determinando, intrane dentes an extra, in buccis an alio in loco: in ipsa vero epistola ad *D. Bartholinum* proximo inde mense scripta p. 23. mentionem facit egressus ad buccas.

Scilicet, quas, cum disputationem haberet, non viderat theses meas, ante scriptam epistolam legerat, ut ipse pagina 37. fatetur, dum ait: *Habita hæc disputatio eodem die, quo castigatoria D. Stenonis, nempe 8. Jul., cum ne quidem videram Disputationem Stenonianam, ne ex eadem mea hæc desumpta forte existimetur.* Egregia sane admonitio, & technas Blasii ipsius Blasii confessione quam elegantissime detegens: nempe qui disputationem, in qua exitum nondum poterat determinare, fatetur habitam, antequam mea vidisset scripta, ex meis & thesibus & figuris hæc duo didicit, 1. glandulam, unde oritur ductus, foveam sub auricula replere. 2. ductum ad buccas egredi, quem sua in disputatione ad latus maxillæ superioris tantum excurrere dixerat, nihil omnino determinando. Sane in supervacuo laborat Dominus Blasius p. 35., cum ait, *quæ in disputatione adduxit, non ex Disputatione Stenoniana desumpta, sed vero ex dissectionibus animalium observata.*

Dolerem enim, si tam crassos, ac ibi ponit, errores ex thesibus

meis didicisset; an vero eosdem ex animalium dissectionibus potuisset haurire, iudicabunt periti.

Hic ortus, hic exitus est ductus Blasiani: ne vero de observationis veritate dubites, tertius jam ab inventione annus agebatur, cum Blasius epistolam suam ad Hobokii subsellia submitteret, eo ipso demonstrans, se adhuc eandem tueri opinionem, quam, cum D. Bartholino eam transmitteret, fovebat. Imo in ipsa illa epistola, post sesquiannum ab inventione scripta, p. 23. fatetur, rem esse facilis indaginis: eo quod obvia satis sint, non minus quod superius dicitur, quam quod inferius, brevia, densa rupturæque minus obnoxia; mox de me addit: quod si facilis adeo res ei, qui nunquam vidit, unde difficultas ei, qui sæpius aliis demonstravit; inde, p. 35. ait: Admovi inquisitioni manum, imo quam sæpissime, & qua veritate dixerim, utrumque Ductum Salivalem ex glandulis maxillaribus originem sumere, facile inveni. Dissectionibus Anatomicis omni tempore pro Collegiis Anatomicis occupatus, qui potui omittere, ut non in ea, quæ primus omnium orbi indicaveram, inquirerem, adeoque nomen meum tuerer, maxime cum detrudere illud mihi, quem Dei opt. max. auxilio emergere vident altius, plurimi allaborent?

Cum itaque & res facilis, & tempus longum, & occasio frequens, & causæ fuerint urgentes, verum oportet hunc credamus esse ductum Blasianum.

Videamus, an idem ille sit, quem ego descripsi.

Blasianus Ductus.

Oritur a maxillaribus internis.

Seu ab eadem glandula, a qua oritur inferior.

Non ab illis, quas in *Medicin. Gen.* parotidas appellat Blasius.

Sed ab illis, quæ a parotidibus usque ad mentum varia coloris & magnitudinis specie se exhibent.

Quæ glandula & cavitatem sub auricula replet profundam satis, & tamen a maxillari interna non potest secerni, nisi unum quid in duas tresve partes velimus secare.

Quem Ego Observavi.

Oritur non a maxillaribus internis.

Non ab eadem glandula, a qua oritur inferior.

Sed ab illis, quas in *Medic. Gen.* parotidas appellat Blasius.

Non ab illis, quæ a parotidibus usque ad mentum varia coloris & magnitudinis specie se exhibent.

A glandula, quæ cavitatem quidem sub auricula replet, profundam satis, a maxillari tamen interna facillime potest secerni, cum duæ distinctæ sint glandulæ, per

Qvæ maxillis non incumbit, sed iis magis substrata est, qvam maxillariis interna.

Excurrit ad latus maxillæ superioris, & terminatur ibi (ait enim: inferior excurrit ad latus frenuli lingvæ, superior ad latus maxillæ superioris).

Defert salivam ad glandulas oris anteriores, ut ea inde motu lingvæ exprimatur.

Ibique habet non modo *foramen unum amplum* papillari excrefcentia munitum, sed & alia magis inconspicua.

Ad buccas egreditur.

intercedentem membranam, sæpe etiam pinguedinem, satis conspiciæ a se mutuo separatæ.

Qvæ maxillis incumbit, nec illis substrata est.

Non excurrit ad latus maxillæ superioris vel in homine, vel in brutis, utpote in buccis exitum inveniens.

Non defert salivam ad ulla oris glandulas, sed per suum ostium immediate excernit.

Habet unicum tantum *foramen amplum*, papillari excrefcentia munitum in quibusdam, in multis hominibus in medio buccæ plano sine ulla eminentia; præter hoc vero nulla alia foramina.

Ad buccas egreditur.

Quis non hinc manifeste agnoscit, qvo jure *Blasius* me ductum a se inventum, totiesqve & tam urgentes ob causas examinatum, mihi dicat attribuere? qvo jure me apud Lugdunenſes Professores Celeberrimos accusarit? qvo jure conatus fuerit me publicæ ignominia exponere? Sed & cui non inde manifestum est, Judicem nostrum neglecto causæ examine sententiam præcipitaſſe, cum me mihi *Blasii* labores attribuiſſe diceret, & inde se in convitia diffunderet? Prudentior *Æſopi* apud *Phædrum* *Vespa* erat, qvæ, Apes inter & Fucos sententiam pronuntiatura, ex sapore mellis & forma favi dignoscendum Authorem judicabat.

Sed videamus certitudinem inventionis, qvam noster nobis Judex promittit. Licet enim verissimum sit, Blasianum hunc ductum *Blasii* inventum esse, &, anteqvam ex cerebro *Blasii* prodiret, a nemine observatum, cum tamen non sufficiat scire verum, nisi & causas, quibus inducti illud verum admittimus, simul fuerint cognitæ, videamus, qvænam illæ fuerint causæ, qvæ *Hobokium* coegerunt, ut

non modo crederet ipse, a *Blasio* inventum *Blasianum*, sed & aliis idem conaretur persuadere.

Certe epistolam evolvendo vides *Blasium* dicere, se invenisse, se mihi demonstrasse, & simul testimoniis discipulorum biennio, imo cujusdam triennio, post habita collegia scriptis probare, se illis eum demonstrasse. Scilicet, quia *Blasius* dicit, se invenisse, quia scriptis quibusdam testimoniis discipulorum probat, se a tam longo tempore demonstrasse, ergo certi fumus, *Blasium* invenisse, ergo & certi fumus, *Blasium* mihi eum demonstrasse: ac si hæc essent demonstrationes Mathematicæ, quibus nihil possit reponi. Non hic exponam, quæ ratione ipsi sua explicent testimonia, cum id in ipsa responsione acturus sim, tantum, ut omnibus pateat, quanti simplex *Blasii* assertio faciunda, alias demonstrationes ex eadem *Blasii* epistola adducam.

Si *Blasio* ut Anatomico, ut Viro honesto & veraci credendum, cum ait, rem non modo levem esse, sed & a se sæpius examinatum, & quidem, ut tueretur nomen suum, maxime in re, quam primus Orbi detexit; eidem etiam *Blasio* credendum, cum, quæ de proprio invento, toties a se tamque urgentes ob causas examinato, observata sibi enarrat. Atqui *Blasio* non credendum est, cum enarrat, quæ sibi de proprio invento, toties a se tamque urgentes ob causas examinato, observata; concludat itaque ipse Lector, quo nomine *Blasius* salutandus. *Blasii* autem observationibus non credendum esse, admittent omnes, qui, quæ manifestæ experientiæ repugnant, aperte falsis judicant annumeranda, e quo genere sunt hæc ex *Blasii* ipsius epistola desumpta.

ERRORES ANATOMICI IN DESCRIPTIONE DUCTUS BLASIANI A BLASIO COMMISSI.

P. 31. & 32. conglomeratas parotides a maxillaribus internis non posse distingvi, nisi unum quid in duas tresve partes dividere liceret.

Ibid. ex maxillaribus internis salivarem superiorem æque ac inferiorem originem suam sumere, licet non præcise ex uno loco.

P. 32. eam esse maxillarem internam, ejusve partem, quam ego conglomeratam parotidem appello.

P. 37. & 44. ductum exteriorem, præter unum foramen in extremo sui notabile, alia inconspicua magis habere, quibus ab eodem provenientes propagines gaudent.

P. 39. quas in *Medicina Generali* describit parotides, non esse eas,

qvas *Whartonus* descripsit nomine parotidum, & ego conglomeratas parotidas appellavi.

Ibid., quas in *Medicina Generali* describit parotides, esse parotides, quas ego conglobatas appello.

P. 40. parotidis conglobatæ ulla rudimenta, etiamsi de parte ejus inferiore intelligas, auriculam cingere.

Ibid. conglomeratas parotidas maxillis æque, imo magis, substras-
tas esse, quam quidem ipsæ maxillares internæ sunt.

P. 43. & 45. glandulas dari, ad quas exterior ductus salivam deferat inde motu lingvæ exprimendam.

P. 50. a parotidibus conglobatis deferri succum qualemcunque ad glandulas anteriores magis iis, ad quas ductus salivalis pertingit.

P. 52. parotides Blasianas, si conglobatæ sunt, ut ipse supra appellat. substantia cum maxillaribus convenire.

Horum omnium falsitas amicis, quorundam etiam publico, innoscit, & ne ulla ulli relinqueretur suspicio, adhuc me eadem demonstraturum sisto. Prodeat modo *Blasius*, & in praesentia iudicum Amstelodamensis Professoris dignitati convenientium in alterutro latere capitis, vel humani vel bruti, hæc demonstret, ego in opposito latere contrarium demonstrabo.

Primum hoc Blafiani Candoris specimen, audite & alterum.

Ductus Blafiani p. 48. ait, ductum falivarem a se ante meum adventum demonstratum, juramento confirmari posse. Ergo vel in glandulis maxillaribus internis ortum, vel in glandulis oris anterioribus exitum demonstratum, juramento confirmabitur: atqvi talis nec ortus datur, nec exitus; ergo juramento confirmabitur, a *Blasio* demonstratum id, qvòd nec a *Blasio*, nec ab ullo visum est, utpote non existens. Qvi *Blasium* hactenus non novistis, ex hisce duobus argumentis, qva fide vir sit, discite, donec in sua apologia ingenium ejus nudum inspexeritis, nudum, inqvam, nulla enim epithetorum amarulentia illud onerabo, contentus solas gestorum historias recitasse, ut pateat omnibus, tantum apud me valere Amstelodamensis Athenæi splendorem, Professoriæ personæ dignitatem, maxime vero modestiæ amorem, ut, licet tot ab illo convitiis oneratus, ne unicum qvidem reponam.

Cum itaque Judex noster nec desiderati candoris Blasiani specimina agnoscere, nec errores Anatomicos observare, nec Blasiani

ductus a meo diversitatem videre potuerit, patet, eum amico suo, utpote in publica dignitate constituto, & tanta cum fiducia suas observationes proponenti, nimium tribuisse, adeoque credulitate hac deceptum id egisse, ut, dum verum Ductum Salivarem Blasianum, seu Salivarem Ductum vere imaginarium, in lucem protraheret, se simul omnium oculis exponeret & rei *Anatomicæ imperitum*, & *afsectum suorum servum*.

Et hæc quidem sufficiant ad demonstrandam Judicis nostri ex præjudiciis ortam sententiæ præcipationem, donec otium permiserit ipsa ea, quæ & *Blasius* mihi & *Deusingius* objecerunt, cum propriis eorundem rationibus examinata omnium oculis exponere, ut eo clarius elucescat, quam facile extra orbitas in devia feratur ratio, ubi laxa semel affectibus frena permiserit.

Lugduni Batavorum, 1663.





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THOMÆ BARTHOLINO

HAFNIAM

APOLOGIÆ *Prodromum Nicolao Kragio transmissi tibi offerendum, spero rite curatum. A Clarissimo Sylvio Disputationum de novo impressarum aliarumque de febribus exemplaria quædam accepi amicis offerenda, quos inter cum nemo mihi sit, quam tu Celeberrime Vir, majori veneratione colendus, hisce diebus Hafniam petenti amico tradidi tibi exhibenda. Cætera, in cordis & musculorum verior scrutinio, sperans brevi, si sufficiens isti labori otium fata permiserint, me utriusque fabricam cum figuris absolviturum. In musculis quæ observavi, an ab aliis fuerint notata, tua me infinita docebit lectio. Tacebo vasa, quæ necdum nisi pauca eaque non magni adeo momenti exhibuerunt, quod vero fibras eorundem spectat, elegantem earum mirari satis nequeo structuram. Quamlibet solam considerans fibram carnosam in medio, in utraque extremitate videbit nervosam, id quod & satis vulgare, sed omnium junctarum compositio mihi visa rarior. Carnosa namque portio non ab uno musculi extremo versus alterum recto ductu extenditur, sed inter latas tendinum expansiones fertur transversa, ita quidem ut carnosarum singulæ parallelum inter sese observent situm. Si enim ab uno musculi extremo versus alterum fieret secundum fibrarum ductum sectio, hæc se manifestam sistet structura.*



A B. Tendo per unam musculi superficiem se expandens.

C D. Alter tendo per oppositam se superficiem diffundens.

E E. Carnosa fibrarum portio inter utramque expansionem extensa.

Integri alias simplicisque hæc est fabrica.

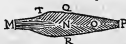


G H. Unius tendinis expansio.

J K. Expansio tendinis oppositi.

L L. Carnosus venter.

Sunt & musculi compositi, lique generis non unius; elegantissimi mihi visi, quorum fibræ hoc modo dispositæ.



P. Tendinum alter, qui in duas finditur expansiones, superior una versus Q diffunditur, altera inferior versus R se expandit.

M. Alter tendo, qui per medium ventrem suas dispergit fibras.

Ab N ad O & porro inter mediam & duas exteriores oppositas expansiones parallelo ductu feruntur carnosæ fibrarum partes.

Nec omittenda videtur quæ cuilibet musculo peculiaris membrana, cujus fibrarum situs transversus & inter carnosas fibras diffusio non parum ad motus explicationem conferre videtur. Sed de his, ut & de speciali quorundam notatu digniorum musculorum fabrica, brevi plura; hæc enim tantum obiter tibi volui significare, ut, si quid de illis a te vel sectione observatum, vel lectione, liceret tua informatione gaudenti tum laboris compendium facere sumptuumque, tum descriptionis rationem secundum tua dictata dirigere.

Quod substantiam cordis spectat: evidenter, ut opinor, demonstratum dabo, nihil in corde reperiri, quod non reperiatur in musculo, nec in corde desiderari, quod in musculo invenitur, si illa respexeris, quæ ad musculi faciunt essentiam, id quod & de auriculis patebit verum. Erit & inde manifestum, nullas in corde dari fibras vel rectas, vel circulares, vel, ut Vesalius describit, obliqvas, sed unius omnes

generis esse, simplices puta, qvales in qvolibet alio reperiuntur musculo, in eo tantum a reliqvorum qvibusdam differentes, qv od non secundum rectam lineam extendantur, sed, ubi a basi conum versus oblique descenderint, iterum superiora versus dirigant cursum. Omnis autem, ut spero, fibrarum utramqve ex autopfia determinabo extremitatem, simulqve monticulorum seu lacertulorum usum, valvularumqve ortum, numerum motumqve, & vasorum naturam spectantia non pauca. Videbunt hinc adversarii tui, qvi figuras in *Anat. tua Reformata*. (edit. Lugdun. an. 1651.) p. 245. expressas, systolen cordis & diastolen nobis exhibentes, existimarunt evidenti rationi e diametro repugnare, se ante victoriam cecinisse triumphum, cum ex fibrarum structura resultans actio ibidem evidentissime exprimatur. Sed fefellit illos de parenchymate cordis minus accurata opinio, qva illud se vesiculæ adinstar habere crediderunt, adeoque, cum brevius redditum intumescit, dilatari, cum longius concidit, angustius fieri. Qv od vero ibi & ligatura, & dissectione, & tactu demonstras, idem & ipsa fibrarum evincit fabrica, unde etiam fere omnium, qvæ ibidem p. 249. a te de cordis in suis motibus forma exponuntur, ratio reddi potest. Sed & evidens erit, conum non esse densissimum, sed ipsum ejus extremum, qvo loco fibrarum superiora versus fit intorsio, in corde bubulo aciculæ capite tenuius esse. Septum vero an pervium sit, necdum licuit videre. Cavernulas sequutus clausas offendi; qvid qv od & exterioribus parietibus suæ sint cavernulæ magnitudine reliqvis non cedentes, sed & innumerus ille fibrarum per septum decursus idem videtur dissuadere. Vix hæc satis, ut vides, properanti exarata calamo, cum ecce mihi a te litteras, qvibus etiam paucis, anteqvam de tabula manum, respondendum.

Cavæ motum inspirationi respondentem a Domino *van der Lahr* credideram inventum, sed inde tribus illam deberi inventionem didici, *Padbrugio*, *van der Lahr* & *Beckero*, qvi simul sectioni tum temporis institutæ intererant. Qv od compressionem vicinarum partium in inspiratione depressarum spectat, locum hic non poterit illa invenire suspicio, cum & in collo & in abdomine ab omnium alias incumbentium vicinia liberata vena nihilominus ita evacuetur, ut latera ejus se mutuo contingant; nec qvam pressioni opponis, difficultas urgere videtur, cum non requiratur, ut tunicas venæ in thorace pervadat aër; sed tantum, ut in venis extra thoracem existens sanguis dilatatam intra thoracem venam ingrediatur. Pressioni vero

ut faveam, sequentia quasi cogere videntur. Extra omnem namque controversiam esse puto, aërem, cum a pellente quocunque vim patitur, vel densari eodem, in quo est, loco, vel alium in locum propelli: ad condensandum autem magnam requiri vim mechanica docet, & experientia evincit, condensationem nunquam succedere, nisi pressum aërem ambientia corpora omnia ad resistendum satis fuerint valida; quod si autem vel minima pars ambientis resistendo fuerit impar, illico a trudente causa propulsus aër, quia elabatur, invenit rimam. Quod si itaque, dum diductæ a se mutuo costæ descendensque diaphragma externo aëri vim inferunt, quantum exterior superficies aërem premit, tantum ei cedant quædam in thorace contentæ partes, necessarium existimarem, non densari aërem, sed eo pelli, ubi minorem invenit resistantiam. Quæ autem cedunt, illa sunt, quæ thorace distento dilatantur, ut pulmones, & thoracem intra existens cavæ truncus; ut itaque pulmones aër diductos implet, aut ipse potius non resistentes diducit, sic & extra thoracem existens sanguis, cedentem cavæ intra thoracem tunicam ut distendat, eo tanquam versus locum sibi non resistantem propellitur. Quod si mea me hic fefellerit ratio, & a vero abduxerit, tuis in viam reduci desiderarem rationibus.

D. *Hobokium* suas tibi in defensionem *Blasii* scriptas misisse litteras, miror. Certe & sibi consulisset & *Blasio* suo, si impressionem dissuasisset; jam vero ut *Blasius* sic & ille demonstrarunt, illorum demum maximam esse temeritatem, quorum minima est experientia: nec credo, in vastis sæpe voluminibus tot inveniendos errores, quot ibi in proprii inventi defensione committit *Blasius*, suoque *Hobokius* assensu confirmat. Miseret me *Blasii*, qui linguam ante manumque non potuit frenare, quam suis ipse scriptis suam publico manifestam reddidisset indolem honesto homino parum convenientem.

Quod equos attinet muresque, nec illorum inde crania, nec horum aperire licuit uteros.

Pro promissa *Diatribæ* gratias ago maximas. Salutat te *Clariss. Borrichius*. *Deusingius* antiquum obtinet, & *Celeberr. Sylvio* gravissima minatur; sed bruta hæc fulmina svavi risu illi *Vir moderatissimus* contemnit. Plura non licet addere. Vale & ama

Leidæ ult. April.

Anno 1663.

T.

discip.

NICOLAUM STENONIS



DE MUSCULIS & GLANDULIS
OBSERVATIONUM SPECIMEN







SERENISSIMO AC POTENTISSIMO
PRINCIPI ET DOMINO,
DOMINO

FRIDERICO TERTIO,

DANIÆ, NORWEGIÆ, WANDALORUM GOTHORUMQVE REGI; DUCI SLESWICI, HOLSTIÆ, STORMARIÆ ET DITHMARSIAE;
COMITI IN OLDENBURG ET
DELMENHORST,

DOMINO MEO CLEMENTISSIMO,

Quæ mihi hactenus in Anatomicis
videre contigit, his paucis comprehensa, quam humillime offero

Subditus devotissimus

NICOLAUS STENONIS



NEUENTE vere superioris anni cum, quæ circa cordis fabricam Anatome, divina favente gratia, mihi tum temporis detexerat, Clarissimorum Amicorum voluntati ut satisfacerem, privatis sectionibus variis & Leidæ & Amstelodami demonstrarem; pollicebar iisdem, me suis singula figuris illustrata publicæ luci proxima occasione expositurum. Ad quod eo felicius perficiendum cum suam mihi operam ex iisdem nonnulli liberaliter offerrent, volui & ego, quantum in me, mea eo studia dirigere omnia, ut, cujus principia tantis Viris non displicuisse observavi, id ipsum plenius pertractatum omnium examini, quam liceret, brevissimum intra tempus submitterem. Sed licet omne moverem saxum, licet, quam mihi præstiterint, humanitatem, quæ suis in nosodochiis hospiti subministrarint subsidia, nunquam fatis laudare possim, non licuit mihi esse tam beato, affecta ut perficerem, tum quod varia me inde avocarent commodissimo sectionis tempore impedimenta, tum maxime, quod ipsa inquisitio, expectationem præter, plurium rerum secum traheret indaginem. Habent enim hoc rerum naturalium examina, ut nihil adeo ab aliorum commercio judicetur alienum, quod non multorum una secum involvat considerationem; & quo diutius inhæres singulis, eo in omnibus plura desideres, uberiores in omnibus inquirendorum offendas materiam.

Prima cordis sectio hæc mihi revelavit: 1. Nullum in corde a fibris diversum parenchyma; 2. nullam in cono definere fibram,

sed intortas circa illum singulas opposito, quam descenderant, loco ascendere. Inde eorundem in aliis confirmationem quaerenti [3.] occurrebat fibrarum ductus, quem in omnibus eundem notabam, puta nec rectum, nec circularem, sed tantum circa medium sui non nihil incurvatum. Hic ego jam facilem ad distinctam claramque cordis adipiscendam cognitionem patere credidi viam, quandoquidem his paucis multa dubia, quae praestantissimos & nostri seculi & superiorum Anatomicos inter se commiserant, sponte viderem evanescere. Sed cum arrepto stylo singulorum aggrederer accuratorem descriptionem, cum omnium & in toto corde & in singulis fibris partium situm ordinemque scrutarer attentius, hic diem excipiens dies, novas oriente luce induxit tenebras, ad quas discutiendas nullum, nisi ab musculorum cognitione, remedium. Et sic cordis scrutinio accedens musculorum examen id effecit, ut alia varia linguam, oesophagum, levatores costarum & earundem depressoires &c. spectantia, imo, ob sectiones in amicorum gratiam instituendas, quaedam peregrina plane ultro se offerrent. Hac itaque ratione non modo occurrentibus forte impedimentis avocatus, sed & aliarum inquisitionum partim necessitate, partim curiositate detentus, non potui ad finem optatum, quae speraveram celeritate, pertingere. Et jam tandem ad umbilicum fere omnia perduxeram, cum ecce casum inexpectatum, qui non a chartis modo & sectionibus me meis abstraxit, sed & omnem simul spem abstulit eodem ad aliquod tempus revertendi. Ne itaque fidem fallere videar, neu, quae hoc fine a me acta, propter alias causas gesta credantur, adeoque suspicionibus parum aequis innoxius subjiçiar, hoc velut indice, quænam illa sint, quæ de corde musculisque meditor, quantum mea mihi suggerit memoria, indicabo. Quia vero observationum non ita pridem editarum, vel amicis tantum inter ut distribuantur, sufficientia exemplaria desidero, quæ mihi de glandulis potiora visa, novis observationibus hinc inde aucta & illustrata praedictis subjungam.

Ut honore dignos ignominiose tractat saepius, saltem tenebris suis relinquit immerfos, sic non magna meritis ad summa rerum fastigia non raro extollit, quæ non malorum minus quam errorum fecunda Mater audit, parum circumspecta eorum, quæ considerari & poterant & debebant, consideratio. Illud suo nos glandulae docent exemplo, hujus vivam in corde imaginem notamus. Cor innati calidi sedem, animæ thronum, quoniam ipsam nonnulli animam voluerunt:

cor solem, imo Regem salutarunt, cum tamen, ubi rem rite examina-veris, non nisi *musculum* sis inventurus. Non equidem ignoro *Galen* effatum, qui *Administ. Anat.* l. 7. §. 8., *Nihil*, ait, *intelligunt*, qui *cor musculum esse dicunt*. Nec obscura magni *Hofmanni* in illos fanna, qui a nerveo plexu cordis deducunt motum, dum de thorace l. 1. cap. 8. ait: *Illos ridebo potius, quam confutabo*. Sed nisi de oratione diducenda, quam de invenienda veritate, solliciti magis hoc in loco fuissent nominati modo Celeberrimi Viri, nisi, quæ sibi ipsi finxerant, principia illis, quæ ex Naturæ phænomenis hauriuntur, prætulissent, suum sic iudicium, ut hic, ita plurimis aliis in locis, minime præcipitassent; nec inquam adeo censuram tulissent de illis, qui, quam ipsi forte sibi persuadere non poterant, sententiam tuebantur. Sc. veritatem negasse parum, a negatione risus si abfuerit & contemptus. Sed rideant licet, dicantque, eos nihil intelligere, qui cum Medicorum Principe, *Hippocrate*, cor musculum pronuntiant, ejusque motus ministros cum recentioribus putant nervos, nervos tamen illius ad motum concurrere, ipsumque cor revera musculum esse, cum sensibus conspirans ratio manifeste satis evinctet: id quod ob multiplicem experientiam nunquam fatis laudati Celeberrimi Viri *D. Harvæus* & *D. Sylvius* jam ante ex parte docuerunt, licet ille distinctam fibrarum non habuerit cognitionem, hunc aliæ curæ coeptam telam pertexere non siverint. Verum quo dicta pateant evidentius, brevem eorum præmittam enarrationem, quæ musculi historiam paulo, quam hactenus factum, clarius, ut spero, distinctiusque notam reddent, tum quorundam usum ex fibrarum situ reddendo certiore, tum veram omnibusque competentem fabricam delineando.

In thorace non ubique Scriptis Anatomicorum respondet autopsia, unde non mirum, tantas opinionum tamque discordes ibi occurrere diversitates. Non hujus loci est nec temporis omnes illas recitare controversias, quas respirationi inservientes musculi hactenus aluere: suffecerit ad illas tollendas, quæ Anatome depromit, indicasse.

Intercostales varii varios voluere, quidam etiam e musculorum numero eximendos, non sane aliam ob causam, nisi quod fibrarum verus in musculo ductus non satis perspectus. In exterioribus id patet maxime, ubi diversos omnino musculos pro uno & eodem habuerunt. Fateor, idem omnes præstare munus, sed id non obstat, quo minus pro distinctis habeantur, qui ortu diversi diversum tendinis habent situm, & angulos cum costis constituunt diversos: quæ

Intercostales exteriores.

*Levatores
costarum.*

les qui a transversis vertebrarum processibus in costarum inferiorum superius latus descendentes *costarum levatores* suo jure videntur salutandi. Hic, qui vertebris continuus, tendo exterius conspicitur diffundi, costis vero qui jungitur, per oppositam interiori superficie partem se expandit. Initium intercostalium hos appellat exercitatus *Spigelius*, qui solus, quod scio, intercostalibus esse cum vertebris commercium, notavit. Sed quis intercostalis musculi dixerit initium, quod ne intercostale quidem est, cum non costam, sed vertebram costæ jungat? Præterea in costis inferioribus vix intercostales, nisi inferioris tendinis extremo velut apice, contingit, cum quibus angulum ibidem in inferioribus constituit tertia quadrantis parte ampliore; nec illa exteriorum intercostalium negligenda pars, quæ superioris costæ osseam extremitatem cum inferioris cartilagine connectit. De carnis vero longitudine tendinisque insertionem quæ dici poterant, ex generali musculorum fabrica patebunt facile attendenti.

Sacrolumbi.

Sacrolumbi verum usum non observatus fibrarum ductus reddidit obscurum: de eo multa possent afferri, sed cum in variis omnia necdum examinaverim subjectis, nec humani cadaveris mihi data occasio, ex quo in illius inciderim examen, quid in paucis illis, quæ interea secare licuit, viderim, brevibus referam. Ossi sacro & spinosis lumborum apophysibus ejus adscribunt ortum, cum tamen minima tantum ejus pars suam inde ducat originem, reliqua, quæ maxima, a costis oriunda. Non vero ab inferiore costa in proxime superiorem illico feruntur fibræ, sed quædam tres, aliæ plures intermedias transcendunt. Nec, quas una emittit, fibræ uni tantum inferuntur, sed quædam tribus, aliæ quinque, nonnullæ septem costis prospiciunt. Pari quoque ratione quilibet conspicuus tendo non ea, quam una subministrat, contentus carne quibusdam in locis a quinque costis emissas colligit fibras. Nec confusa hæc adeo, quin in subjecto mediæ magnitudinis separari & demonstrari possint facile, tum a tendine retrorsum descendendo sectione recta, ut multiplices ejus conspiciantur ventres, tum sectione laterali seu transversa a spatio inter costas intercepto sursum pergendo, ut tendinum unius ventris videatur numerus: quandoquidem quilibet integer venter pluribus tendinibus largiatur suam singulis partem, & integer quilibet tendo pluribus e ventribus suam a singulis partem accipiat.

Triangularis.

Triangularis dictus musculus a costarum verarum ossea extremitate ad mediam sterni lineam pergit, sed non eodem fibrarum ductu;

quandoquidem superiores acutum cum sterno angulum conficiant, illas vero excipientium reliquarum, quo fuerint inferiores, eo anguli minus acuti deprehendantur.

Diaphragmatis historia multis & dubiis scatet & falsis. Nec enim centrum versus omnes confluunt fibræ, nec in centro motus principium, sed fibrarum extremitas in vertebra altera, altera in ambitu, quæ costis sternique appendici jungitur, mediam vero membranam tendinum fibræ constituunt, inter medias carnes, velut in digastrico musculo, interceptæ, ductuque non recto, sed vario, quam elegantissime circumductæ. Radices ejus binas tantum agnoscunt uni vertebræ insertas, cum mihi pauciores tribus nunquam visæ, sæpe vero quadruplices notatæ, semper, quotquot fuerint, duarum se mutuo excipientium vertebrarum superiori supercilio circa medium infixæ, unde per mediam earundem asperam lineam descendere tantillum videntur. Nuper in cane, ubi tres diaphragmati erant tendinis hujus partes, vidi minorem finistram tertiæ dorsi vertebræ insertam, dextras vero, quæ & binæ erant & singulæ dicta majores, tertiæ quarumque continuari. Carnium ductum circuli radiis voluere similem, sed parum congrue: fac enim illis competere, quæ costarum inhærent circulo; quarum tendines versus dorsum confluunt, omnino repugnant. Quid quod membranarum quidem, non autem ubique fibrarum interventu reliquis adhæreat, cum tota radices ejus inter & costas intercepta peripheriæ portio, si pleuram separaveris & peritonæum, omnino libera sit conspicienda. Liceat mihi cum Anatomicorum venia dicere, necdum ullam diaphragmatis mihi in illorum tabulis visam figuram, quæ veram ejus testetur factam Anatomem; usque adeo nec fibrarum vel in carne, vel in tendinosa membrana ductum, nec tendinum vel in costas, vel in vertebra insertionem, nec destinatum ventriculo transmittendo hiatum vere delinearunt, ut taceam, quæ alia, quo loco in tendinem abit caro, elegantissima potuissent notari. Sed, nisi Deo aliter visum, de his aliisque alibi plura. De principio ejus & fine quæ non leguntur disputationes, licet partem parti non adducat diaphragma? Nec enim, cum vel maxime tenditur, in rectam extensum est, nec, circa quam moveatur, trochleam habet (nisi abdominis hic volueris nominanda contenta), nec quibus inhæret, solam præter cartilaginem ensiformem, ulla pars, dum ipsa movetur, mobilis est: vertebra namque fixas quis negabit? Costas vero rigidas, qui illas elevant, tenent muscoli. Multa alia

Diaphragma.

sunt, quibus respirationis historiam obscuram reddidit neglectum accuratius muscutorum examen, sed nihil majorem movet admirationem, quam quod costis movendis illos addixerint musculos, quorum opposita si quiesceret extremitas, alii tenderentur muscoli, ut pars, cui inhærent, ratione costarum, pro quiescente haberetur. Sed his missis quorundam muscutorum describam in respiratione usum, quorum demonstrationem Mathematica forte non minus certam non poterit non invenire, qui, quos dorsum, costæ, sternum, musculi inter se conficiunt, angulos attente examinare non recusaverit.

*Muscutorum
quorundam
in respira-
tione usus.*

Levatores costarum cum intercostalibus exterioribus 1. & sursum & retrorsum costas movent, 2. spatia intercostalia dilatant, 3. intercartilaginea intervalla contractiora reddunt, inferiorisque costæ cartilaginem versus superioris osseam extremitatem adducunt.

Triangularis musculus versus costarum verarum extremitates osseas sterni humiliores partes sursum adducit, cartilaginum spatia contrahit, ossium spatii dilatandis inservit.

Intercostales interiores 1. sternum quasi detrahunt, 2. cartilaginea a se invicem diducunt, 3. costas superiores ad inferiores deducunt, earumque spatia reddunt arctiora.

Sacrolumbus dictus costas & deducit, & ad se adducit mutuo.

Diaphragmatis non tam ora contractior fit, quam arctior convexitas: omnes enim, quas a vertebrae ad reliquum ambitum placet consipere, lineæ, & cum resolutum languet, & cum tensum riget diaphragma, quadam sui parte incurvatæ sunt, convexa thoracem, abdomen concava respicientes. Hæ quo minus tensæ, eo magis convexæ, eo amplius abdomen, angustior thorax; quo vero contractæ magis, eo minor convexi diaphragmatis superficies, eo thorax amplior, angustius abdomen. Et sic thoracis fundus, in inspiratione depresso, in expiratione adscendit: quid vero diligentissimo alias Arantio imposuerit, qui se in æqua & visu & tactu observasse ait, in expiratione constringi diaphragma, non video.

In cygno primum, hinc & in gallina vidi a costis in pulmonum membranam carnosas ferri fibras, sine omni dubio in respiratione non otiosas.

Sed hæc ὥς ἐν παρόδῳ; ad observationes ipsam musculi fabricam spectantes progrediamur.

Fabrica

muscutorum. Cum ab cœpto cordis scrutinio deterrere me inciperent, quibus muscutorum doctrina involvitur dubia, cuniculi, cujus tum forte

ad manus cadaver, pedem arreptum in suos resolvi musculos visus, num spes ad certiora perveniendi superesset. Primus, in quem forte incidi, resectus, & ab extremo ad extremum recto ductu divisus, simplicissimam omnium, quos inde videre contigit, exhibuit figuram: tendines enim oppositi in extremis collecti, ad carnosum ventrem ubi pervenerant, diffundebantur ita, ut alter superiorem, inferiorem alter medii ventris per superficiem expansus sensim attenuaretur; has inter expansiones tendinosas carnosæ recto ductu incedebant fibræ, suis singulæ tendinosæ fibris continuæ. Inde alios aliosque ad examen vocavi musculos, qui primam observationem ad unum omnes egregie confirmabant. Licet vero primam in omnibus invenirem figuram, non tamen eodem ubique modo: in quibusdam omnino simplicem, in aliis compositam, & id quoque varie; vix autem in ullo elegantior, quam in temporali, qui a maxillæ processu ad cranium usque fibrarum ductum sequente cultro dissectus pulcherrimo oculos schemate oblectavit. Tendo enim inferior mediam in carnem adscendens in laminam quasi sensim attenuatur, cui carnes eodem utrinque adsistunt modo, quo pennas avium plumæ ornant: quæ ab interiore tendinis latere oritur, caro proxime continuatur cranio, opposita pars expansum habet supra se tendinem, quo interveniente itidem cranio inferitur. Miror, non ad ulterius examen scitissimo fibrarum ductu abreptos, qui e medio temporalis prodire viderunt tendinem. Sunt & alii hinc inde quærendi muscoli, quos idem fabricæ commendat artificium.

Simplicissimum.

Compositum, ut temporalis.

Inde ad *lingvam* perrexi, ubi musculorum extrema in peculiarem abire substantiam voluerunt. Sed facto examine vidi, peculiarem hanc substantiam musculosam esse, quod ut alii sic & Nicolaus Massa in suo *Libro Anatomix Introductorio* a variis lingvæ motibus demonstravit, licet fateri coactus, carnem hanc non esse distinguibilem, sed tantum per operationes cognoscendam. Sed ἀδύνατον illico non pronuntiandum, quod nobis ἀδύνατον forte visum. Ab apice namque ad ipsam usque basin distincte omnes fibrarum series demonstrare licet attendenti, quæ in toto lingvæ corpore tantum triplices. Exteriores superiori quæ superficiem proximæ fibræ rectum secundum lingvæ longitudinem servant ductum, reliquarum totum medium corpus occupantium duo tantum genera, unum, quod a superiori lingvæ plano descendit, alterum, quod a medio versus latera in homine recedit. In certas hæc duo genera series disposita sunt, se

Lingvæ substantia.

alternatim excipientes, quarum singulæ vix nisi unam in crassitie continent fibram, ita ut stratum super stratum hic non inepte applicarent Chymici. Ipsum superius lingvæ planum tunicam exteriorum inter & carnes carniū tendines servat clausos. Sed hæc innuisse suffecerit; nec enim patitur locus ad opiniones gustum spectantes lingvæque varium in variarum litterarum pronuntiatione motum explicandas evagari.

*Œsophagi
carnea
dicta tunica.*

Œsophagus in quibusdam, quibus contextitur, fibras multas licet possideat, spirales omnes ad duo tamen genera commode illas reduxeris, duas nempe cochleas, quæ, ubi contrario ductu sibi occurrunt, ita se interfecant, ut quæ sub altera eo usque inceserat, mox alteram scandens supra illam, donec sibi iterum occurrant fibræ, progrediatur. An aliis etiam piscibus datus, quo raja superius ventriculi sui orificium constringit, musculus, nondum experimento didici. Elegans ille omnino unius tantum generis spirali linea multis vicibus dictum orificium ambit.

*Ventriculi
in raja
superior
sphincter.*

Longum foret singulos recitare musculos, omnesque ibi occurrentes evolvere differentias; certas tantum proponam conclusiones ex observatis deductas.

*Partes musculi
compositæ.*

I. In omni musculo reperiuntur arteriæ, venæ, nervi, fibræ, membranæ; addunt quidam lymphatica, quæ licet circa musculos viderim sæpius, in musculis necdum mihi visa ingenue profiteor.

*Fibrarum
extrema.*

II. Nullus occurrit musculus, cujus singulæ fibræ non abeunt utrinque in tendinem; sive tendines hi omnes vel utrinque, vel ab altera tantum parte in firmos colligantur tendines, sive in membranam diffundantur, sive in osseam degenerent rigiditatem, quod non fini magis competit quam principio.

Medium.

III. Caro non est parenchyma vel tomentum, sed eadem fibrillæ, quæ arcte sibi connexæ tendinem componunt, laxius junctæ carnem constituunt. Et hoc sensu vere dictum, tendinem esse corpus continuum a principio musculorum ad finem.

*Ductus &
anguli.*

IV. Nulla in ullo musculo facile reperiunda fibra, unam rectam quæ constituat lineam, sed singulæ in tres minimum lineas, quæ duos angulos alternos comprehendunt, divisæ. Nec ipsæ hæ tres lineæ semper rectæ, sed sæpe caro (ut saltem in sphincteribus, quos musculorum nemo facile exemerit numero) interdum & tendo (ut cum incurvata manu adducuntur digiti) curvam efficiunt lineam.

Quantitas.

V. Nominatæ tres singularum in eodem musculo fibrarum lineæ

non eandem servant longitudinem, licet totæ fibræ inter se collatæ vix ullum extensionis agnoscant in plerisque musculis discrimen.

Sed ut hæc fiant intellectui clariora, præmittenda partium specialior denominatio. Binas musculus quilibet rectus & simplex, qui aliorum norma, sectiones juxta fibrarum ductum admittit, rectam alteram, alteram transversam, non quidem plano per medium transversim omnia secante, sed ita a latere ad latus acto, ut tendines cum carne maneant integri, ut itaque distincta distinctis sint nomina, liceat series fibrarum rectas ordines, transversas autem versus vocare.

Ejusdem ordinis fibræ in eodem plano sunt, & parallelogrammum obliquangulum, seu rhomboideam exhibent figuram, cujus duo opposita parallela, quo loco cum reliquis parallelis acutos comprehendunt angulos, angulos extra oppositas in partes porriguntur. Et hæc extra figuram pergentia parallela oppositos tendines referunt in diversa abeuntes, reliqua his intercepta, totamque figuræ aream replentia, parallela carniū situm repræsentant. Rem Physicam proponenti venia detur, si Mathematicis nominibus Physicas, non Mathematicas, designem lineas. Adeo enim omnis latitudinis non sunt expertes hæc lineæ, quin carnes singulæ totidem parallelogramma, tendinum duæ oppositæ collectiones duo trapezia referant. Sed illam Mathematicis relinquamus ἀριβαίαν. Hic notandum primo in utroque tendine, ut ut tenui, totidem esse filamenta sibi mutuo incumbentia, quot in ventre numerantur carnes, unde patet, quanto compactiores carnibus tendines. 2. Interiora filamenta tendinum exterioribus semper breviora: hinc in eodem ordine fibræ licet & totæ, & quæ carneæ sunt, inter se sint æquales, tendinosarum utrinque partium certam servant inæqualitatem, quam syringæ veterum assemblaveris non inepte: & sic quemlibet ordinem accuratius si inspexeris, tres invenies figuras, duas sibi inverso modo oppositas syringas, & medium parallelogrammum.

Fibrarum versus ut plurimum in tres figuras resolvitur non eodem plano incumbentes, unam carniū, quæ rectangula, tendinum duas, quæ vel rectangulæ, vel triangulæ, vel trapeziæ pro varia tendinis integri figura, hinc facile singularum in versibus fibrarum determinanda quantitas. Ex versibus sibi mutuo ita impositis, ut media illorum plana quoddam quasi parallelepipedum componant, musculus exsurgit, ubi versus compages ex fibrarum in ordinibus serie innotescit; cum tot in musculo sint versus, quot in quolibet

ordine fibræ, & in verbis extimis tendinum oppositorum ejusdem versus maxima notetur in extensione diversitas, in reliquis, qvo ab extremo versus medium recesserint propius, eo magis magisque sensim decrefcatur oppositorum tendinum inæqualitas.

*Musculi di-
vifio in ex-
trema &
medium.*

VI. Vere & commodè quilibet musculus dividitur in ventrem & tendines, f. medium & extrema; de fine vero & principio deque ligamento controversiæ nunquam, nisi certum posueris fundamentum, determinandæ. Si liceret mihi hic libere fari, non ego carnes respicerem, non tendines, nec de nervi insertionè sollicitus essem, sed extremum quiescens principium, mobile finem dicerem: cum vero vices interdum mutant extrema, & quod jam mobile, alio corporis situ, quiescens evadat, abstinere potius istis nominibus, & in extremorum appellatione acquiescerem, cum, propriè loquendo, neutrum vel principii vel finis mereatur nomen. Nec enim eo modo generatur musculus, ac si ab una parte sensim progrediretur versus alteram, cum sanguinis id non patiatur motus; nec omnibus semper musculis eadem extremitas quiescens; & si pro principio illud habendum, versus quod reliqui sit motus, in omnibus musculis pro principio habendus venter, quandoquidem, pro situ vario, utriusque extremi ventrem versus fiat motus, & in ventrem vasorum fiat insertio: adeoque si partium successiva admittenda generatio, inde petenda origo, ubi vasorum insertio deprehenditur. Sunt hujus generis alia, quibus multum temporis impenditur & chartæ, & tandem, ubi examinata omnia, probabili ornando discursui serviunt, rei veritati nullum omnino præstant usum. Ut itaque in certis subsistamus, retineamus musculi divisionem in ventrem, seu mediarum carniū corpus, & tendines, seu extrema. Nec enim existimandum carere extremorum altero musculus, cujus carnes ossibus, sine interveniente tendine, inhærent, ut in parte musculi temporalis, in variis artuum musculis. Nonne in prima partium generatione, quæ modo ossa, membranæ fuere? At in ossa tendines abire, in avium genere frequens; ubi sane non aliter medio tendinum ossi continuantur carnes, quam musculi temporalis carnes cranio inseruntur.

Tendines.

Duo itaque in quolibet musculo tendines ex tendinosarum fibrarum verbis compositi, cum ex oppositis partibus prodeant, per ventris oppositas hedras expansi sensim tenuiores evadunt. Suntque vel simplices, quorum expansiones exterius conspiciuntur; vel compositi, ubi in uno extremo per medias carnes ingreditur, in altero

medias utringve amplectitur carnes, & hic musculus videtur ex duobus quasi musculis compositus.

Ventris longitudo carnosarum fibrarum non semper mensura, *Venter.*
cum longissimus sæpe venter brevissimas obtineat carnes.

VII. Membrana non modo transverso fibrarum ductu musculum *Membrana.*
ambit, sed & eodem se modo inter singulas ejus insinuat fibras.

VIII. Musculi quidem actio est contractio, sed eam quadam velut *Musculi actio.*
necessitate minime sequitur, ut inter duo extrema musculi puncta intercepta recta evadat brevior, sed ut breviores semper fiant inter eadem duo puncta interceptæ singulæ ejusdem musculi fibræ.

Qui contrahitur, non tendo est, sed tendinosas inter expansiones comprehensa caro, quæ in se contracta id efficit, ut opposita duo vel plura ventris plana ad se mutuo propius accedant, non itaque primum motus instrumentum tendo, nec musculi vel principio motum debemus, vel fini.

Contractionis modus determinatu difficilis, cum a repletione fibrarum multi eam deducant, ab inanitione nonnulli, quidam vero ad utramque confugiant. Temerarius essem, si hic meum interponerem arbitrium: quare de causis modisque non liquere aperte pronuntio, & cum per similia explicatio multis magnopere arrideat, dabo, quod hic non erit omnino ἀποσδιόυσον. Qua palos sublicasque in terram in substructionibus pangunt, machina, ubi plurimi homines suam singuli trahentes chordam funis ductarii interventu fistucam elevant, musculum per mediam carnem transversim dissectum non inconvenienter refert: chordæ namque tendines imitantur, pro hominum distantia sensim longiores, affixum chordis pondus partem mobilem, ipsi homines carnosas fibras: ut enim homines breviores redditi, suas dum simul trahunt chordas, pondus movent; sic carne contractæ fibræ, dum tendinis trahunt fibras, mobilem movent partem. Sed cum simile hoc tantum sit, non diutius ipsi immorandum.

Quo brevior in longiore ventre caro, eo vis contrahendi fortior, cum fibrarum major sit numerus.

IX. Quæcunque pars nec musculo necessariam ullam desiderat partem, nec aliam musculo denegatam possidet, & fabricam simul musculo convenientem obtinuit, non poterit non musculi mereri nomen. Nec requiritur, ut actu voluntatis subjecta sit imperio; multi enim in multis musculi nunquam ad animæ moventur arbitrium, quod in variis laryngis lingvæque musculis, ut & dorfi singulo-

rumque artuum probatur. Et quid, quæſo, in animali motu agit anima? Nonne viſum ab alio motum variis flexibus tam diu imiſtatur, ipſum donec verum forte invenerit? Sed manifeſtiora hæc, quam quæ pluribus diducenda, cum nemo non in ſe ejus rei evidentiſſima deprehendere valeat, quot velit, argumenta.

Quid prædicta muſculorum fabrica ad morborum quorundam cuſ rationumque rationes facilius explicandas accedente ulteriori examine conferre poterit, ex ſequentibus, velut ex ungve, dignoſcere licet.

Dixi, carnem tendinoſas inter expansiones contineri, jam vero in gallo Africano non ita pridem vidi in variis pedum muſculis totam tendinoſam expansionem a ſubjecta carne ita liberam, ut non niſi tenuiſſimis quibuſdam fibrillis illi adhæreret, quæ accedente vel leviffima vi rumpebantur illico, & ſic membranae inſtar conſpiciebatur tendo. Ipſæ vero extremitates carnoſæ, quæ huic ante continuæ fuerant tendini, a reliqua carne, qua albicantiores quidem, ſed & firmiores, ſecedebant facile, ſimulque humiditatem quandam ſibi habebant circumfuſam. Hæc quidem ſemel tantum in gallo obſervavi; quid vero impedit, quo minus idem humanis quoque muſculis interdum eveniat, adeoque motus in certa parte debilitati, vel in totum in eadem ablati, hæc interdum poſſit eſſe cauſa, prout vel omnis, vel ſui quadam parte a carne ſeceſſerit tendo? Creditum hactenus, ab uno extremo ad alterum recta in muſculo extendi fibras; unde ſeqveretur, a ſectione tranſverſa quacunque lædi motum, minime vero a recta. Evidens quidem illud, ſi medius tranſverſim divideretur muſculus, omnes diſſecari fibras; ſed & illud clarum muſculi reddit fabrica, poſſe vulnus per medium tranſverſim muſculum lato agi ferro, motu non violato, modo intra eadem parallela maneat ferrum, nec oppoſitas expansiones lædat. Ex adverſo rectæ illæ ſectiones omnes, quales infinitæ, quæ non eoſdem duos fibrarum intra ordines ſe continent, cum fibris motum plus minusve lædunt, prout varie dirigatur culter.

Quæ hic de muſculis propoſita, ſi cordi applicentur, ſufficiunt propoſitæ initio demonſtrandæ propoſitioni, *Cor vere muſculum eſſe*. Deducam hoc alias fuſius, hic tantum præcipua paucis recitabo.

Partes cor
conſtituen-
tes.

I. In univerſa cordis ſubſtantia nihil occurrit ſequentia præter: *arterias, venas, nervos, fibras, membranas*. Sed nec in muſculo, præter dicta, occurrunt alia. Taceo pingvedinem, oſſa; quia nec omnia his

instructa corda, nec nullus iisdem præditus musculus. Quicquid vero de parenchymate profertur a fibris distincto, Anatomicorum non sensibus debetur, sed ingenio. Vidi quibusdam in subjectis splendentes per superficiem cordis decurrere ductus, quos tamen non lymphaticos, sed veros esse nervos dissectio docuit. Plexus nervorum a *Fallopio* descriptus autopliam sibi habet faventem non minus ac eorundem, ut per superficiem dispersio, ita ad interiora penetratio.

II. Inter cordis fibras nulla scrutanti mihi obvenit, quæ non medio carnosa, extremis utrinque tendinosa, id quod & omnibus musculorum fibris commune. *Fibrarum partes.*

In corde non minus, ac in alio musculo, villorum uniformis est ductus; omnes enim circa mediam fere carnem arcus instar inflexi nullos, nisi cum tendine utrinque, conficiunt angulos. Rectos, transversos, circulares villos finxere, qui Naturæ fines æque sibi credidere notos, ac si illi fuissent a secretis. Videntur quidem intricati, sed nec confusi sunt, nec inextricabiles; quandoquidem una eademque intorsionis sit ratio omnium in sinistro ventriculo occurrentium, id quod conii in stellarem figuram resolutio clare demonstrat. Nec in dextro ventriculo caute progredientem Labyrinthi morabuntur flexus. Figuris ea, quam verbis, intelligerentur commodius; paucis tamen eorum quandam velut ideam dabo. *Ductus & anguli.*

Exterior cordis a membrana fibrisque liberati facies primo ad spectu svadere videretur, eundem omnium undique fibrarum, obliquum puta, a basi ad conum esse ductum; sed ipsas inde carnes a se mutuo separantibus patet, dictarum paucissimas ad conum pertingere; cum a basi, tantillum sub sequentibus ubi descenderint primæ (liceat primas hoc loco vocare, quæ antè in sinistri ventriculi orificio conspiciuntur in ipso cum dextro concurfu), illico intortæ sub reliquis sinistrorsum ferantur: sic sequens semper fibra præcedente tantillo longius descendit, anteqvam incurvetur; incurvata vero sequentem subit itidem, non nisi infra prioris intorsionem inflectendam. Et hæc fere omnibus fibris competens incedendi ratio, quæ vix explicabitur commodius, quam si mente concepto aut manibus formato ex fibris parallelum inter se situm servantibus parallelogrammo, sic satis oblongo, ex brevissimis lateribus, quæ filorum extrema habent sibi annexa, alterum semel inverteris intergrum absolvendo circulum; similem hic namque filorum & intorsionum se, & se mutuo scandentium videbis imaginem. Quod si

vero etiam plura id generis parallelogramma finxeris, fecerisque ad parallelepipedum aliquod componendum concurrentia, hedrarumque, cui innexa fila, alteri, quem dixi, situm dederis, & insuper easdem breviores hedras, sibi ante oppositas, reddideris in eodem plano ita sitas, ut medius filorum laxior ductus arcum repræsentet, non amplius confusam fibrarum in corde accusabis seriem. Sed figuris hic opus ad singula clarius demonstranda, quas in alia tem-
pora differre coacto non conveniet hic multis exponere: quomodo in parietibus ventriculorum fibrarum variet ductus; qua ratione ex fibrarum exteriorum diversis e locis prodeuntium concursu interiores exsurgant monticuli; quam elegantem exhibeat figuram coni varia resolutio; qui oculis exhibendus, ubi carnibus continuantur tendines, carnum in oppositas partes a se mutuo digressus; & plura alia, quæ manum attente & patienter admoventi sponte se fistent, alioquin in ipsa cordis historia integre proferenda.

Venter.

Ventrem hæc musculi nostri & cordis simul ventres constituit fibrarum media, seu carnosa, portio, cujus substantia, licet omnium & oculis & manibus obvia, tot peperit rixas, quot vix ulla pars alia. Dividunt hanc in basin & conum, quem hactenus credidere densissimum, licet medium ejus punctum, seu relictum in medio interiorum fibrarum centrum, adeo tenue sit, ut aciculæ vix æquet caput, cum non nisi exterioris ibi membranæ cum interiore fiat concursus.

Tendines.

Extrema carnum excipientes tendines in ostiis partim, partim in monticulis conspiciuntur, ubi & valvulas componunt, & in arteriæ substantiam abeunt. (Venis enim, utpote quæ auricularum alteri tendini continuæ, nullum nisi mediantibus auriculis cum corde commercium.) Hic musculi & principium quærendum & finis; hunc arteriæ pulmonalis orificium & utriusque ventriculi valvulæ tricuspidæ, cum aortæ quadam parte, ea nempe, quæ valvulam mitralem constituit, repræsentant, illud, qui arteriæ magnæ reliquam basæos portionem largiuntur, tendines.

Non hic exponam, quo loco vel super, vel inter carnes se expandat tendo, nec carneam in dextro avium ventriculo delineabo valvulam, nec, quam in variis animalibus observavi, variarum partium diversitatem recensebo, cum nullius mihi adfuit figura, non omnium incidat memoria.

Os.

Officulum in corde repertum non in grandibus modo animalibus, sed in ovibus etiam sæpissime mihi visum, nec omnibus inest ani-

malibus, nec, quibus est, quicquam est, nisi tendinis pars in osseam duritiem degenerans. Sic non in pennatorum modo pedibus medio in tendine ossea notatur soliditas, sed & in quolibet animali multorum musculorum alter tendo, vel totus, vel sui parte, in os abit, quod, ut in cranio, sic & in manibus pedibusque demonstratu facile. Quæ itaque ratio extracto e cervi corde officulo alias attribuendi vires, quam alteri ejusdem animalis (non enim dubito, quin in diversis animalibus etiam ossium diversa nonnihil sit natura) ossi, cujus partem musculi faciunt tendines?

III. Membrana cordi propria transverso fibrarum ductu cordis fecat fibras, eodemque inter illas se insinuat ritu, nec aliud in musculi occurrit membrana. *Membrana.*

Cum itaque vera musculi attributa cordi competant omnia, nec illa præter aliud inveniatur, vere *cor musculi nomine salutandum*, quod meretur & tendine, & carne, & nervo.

Quæ licet magno Hippocrati videantur directe repugnantia, qui dicit: καρδία μὲς κάρτα ἰσχυρὸς οὐ νεύρω ἀλλὰ πηλήματι σαρκὸς, ipsa tamen verba ordine inter se comparanti cum nostris apparebunt amice consentientia; dicit enim, musculus esse, cujus robur non in tendine, sed in carne. Atque sic quæcunque demum fuerit Authoris sententia, verba ejus minime nobis sunt adversa.

Nisi crederem, quælibet per se facile inventurum, quæ dubia hæc unica solvit propositio, nihil facilius esset, quam longum eorum hic attexere catalogum, quorum nonnulla non Veteres tantum, sed ipsum etiam Harvæum aliosque Recentiores multos, tenuere hactenus suspensos: ex præcipuis tamen quædam proxime ex illa propositione sequentia adjungam.

Si certum est, quod certum esse sensuum ope adjuncta evincit ratio, in corde nihil desiderari, quod musculo datum, nec quod musculo denegatum, in corde inveniri: non erit cor amplius sui generis substantia, adeoque nec certæ substantiæ, ut ignis, calidi innati, animæ sedes, nec certi humoris, ut sanguinis, generator, nec spirituum quorundam, vitalium puta, productor. *Quid substantia cordis non sit.*

Quod si enim in omnibus continentibus cum musculis cordi convenit, etiam in substantia cordis vasisque contenta omnia cum contentis in musculo ejusdem erunt naturæ, nam idem utrique eadem per vasa subministratum eadem recipitur substantia: cui ultimam veluti manum imponit, quod eadem utrobique actio, puta carnis contractio,

conspiciatur, cujus causa proxima, num a causa proxima contractionis musculorum, in tanta organorum omnium similitudine, tamque amico consensu, diversa esse poterit, videant subtiliores.

Sed cordis hæc tantum substantiam spectant, non cavitates, ubi, num quid sanguine in vasis contento nobilius inveniendum, cordis disputent patroni. Certe, si quid ego video, vereor, ne omnia de partium dignitate argumenta oratoria futura. Sed ut ut sit, solam ego sumpsi examinandam substantiam, & ex fibrarum ductu omnia de cordis motu occurrentia phænomena suis rationibus demonstranda; quod licet maximam partem absolverim, in aliud tamen differre tempus cogor, cum, ut initio monui, a chartis abstractus & sectionibus ad aliquod tempus easdem repetendi otium vix inventurus sim, & simul hæc sic præmississe placeat, ut, si quid in iis emendandum veritati invenerit industria, monueritque humanitas, in ipso dein opere corrigatur, & longiore meditatione & exercitio desiderata suppleantur.

*De cordis
motu.*

Ne tamen de motu nihil omnino dixisse videar, subjungam & hanc propositionem. Cum fibræ cordis breviores fiunt, quia basin circa & principium earum & finis, *conus necessario attollitur*; quia a basi sinistrorsum ad conum descendunt fibræ, *contrario conus modo adscendit*; quia in dextro interius a septo descendentes oblique posteriora versus per exteriorem superficiem adscendunt, *fundum dextri basin versus tantillum elevant, adeoque & brevior fit cor, & in dextro latere rotundius*; quia vero & breviores fiunt parietes & crassiores, *angustiores etiam evadent ventriculorum cavitates. Non itaque rotundum cor oblongo capacius, adeoque nec a sanguine magis dilatato rotunditas, nec eo tempore diafole.*

Quid in orificiis cordis, quæ spatium, quæ valvulas observandum, stamina quomodo moveantur, qualis auricularum musculus, quot modis viderim cessantem cordis motum ipsi restitutum, & quidem interdum multis a morte horis, idque repetitis vicibus, & quæ huc spectant alia, cum singulorum mihi non succurrat, omnia integro operi reservabo adjicienda: quocirca missis musculis ad glandulas pergo.

GLANDULÆ.

Glandularum quousque ignota natura, vilis fuit æstimatio, ritu a communibus viventium moribus non alieno; ubi multi sæpe in obscuro latitant, non extra limina noti, non quod non meliore digni fortuna, sed quod eorum ignotus valor. Multum itaque huic seculo

debent glandulæ, quod, ut in earum indaganda natura diligens fuit, ita in honore restituendo felix.

Rotundas five conglobatas omnes fordidarum (quod de omnibus glandulis Antiquorum fuit iudicium) numero purissimæ Bartholinianæ exemerunt Nymphæ, quæ sua illas lymphæ a præteritorum seculorum eluvie mundas reddiderunt. Conglobatæ.

Restitutionis suæ primordia *Wirtzungio* debent conglomeratæ: sed ut primus Author sua pancreatis gloriam morte expiavit, sic, illum inde qui sequuti, parum fuere felices; *Whartoni* namque industriam sua defraudare laude voluit *Deusingius*, & salivaris exterioris inventionem inventori ignominiosam reddere conatus *Blasius*. Sed meliori, ut spero, fortuna, quæ priora tria exceperunt, vasa reliqua gaudebunt. Conglomeratæ.

Utrumque circa genus, quæ nostra mihi Diva, Anatome, revelaverit, ex parte in *Observationibus*, ante biennium editis, dixi, reliqua in iis, quas necdum absolvi, exponam; hic præcipuorum brevem tantum facturus recensitionem. Spectant autem ea vel prioribus non descripta vasa, vel vasorum ante observatorum illustrationem, tum glandularum utriusque generis meliorem cognitionem.

Nova, faltem mihi, vasa sunt

I. *Salivare exterius*, cujus radices parotis conglomerata, ostium in homine buccæ interioris fere centrum exhibet, medius ductus in variis animalibus varius, in homine, cane, lepore, cuniculo rectam æmulatur, in ovibus incurvatur, maxillæ tamen tota, quam perficit, via incumbens, in boum vero genere ad maxillæ inferiorem angulum descendit, inde, ubi ad sinum eidem maxillæ insculptum perrexerit, buccas versus ascendens. Ductus hujus a Blasiano, vix extra Authorem, nisi forte in Lunæ incolis, aut *Epicuri* intermundia perreptantibus inveniundo, diversitas, in quibus consistit, *Apologiæ Prodtromus* anno abhinc editus clare satis detexit. Quocirca cum illa, ut spero, abunde manifesta res, & amicis sub certa conditione promiserim, me ad ulteriora non progressurum, de testimoniis ejus (quod unicum illius argumentum) hic tantum monebo: longo ea tempore post rem gestam scripta, & quidem a discipulis ejus, quorum qui solus fidem merebatur, præsentibus duobus Professoribus Clarissimis, agnovit, se in assignando tempore errasse, sequæ novi ductus factam mentionem scire, ille vero superiorne fuerit, an inferior, & utrum alterius, præter eum, salivaris ductus facta vel mentio vel demonstratio, an non, certo sibi in memoriam non posse revocare. Hæc Vas salivare exterius, five parotidum vas.

& alia, quæ aliis moverent bilem, plurima æquo animo tuli, licet ea mihi fuerit sitque causæ iustitiæ, ut quovis tempore in iudicium vocare possim & ipsum, & *Hobokium*, & Anagrammaticam *Hobokianum*. Sed mea mihi sufficit conscientia & honestiorum, quos inter vixi semper, de me opinio; eoque me geram modo, ut si placuerit illis una cum *Deusingio* mihi insultare diutius, in proprio illos foro possim redarguere. Theses ille meas injuriosos appellavit libellos, &, ut cætera taceam, impotentis animi indicia, ætatem mihi meam exprobrare non erubuit. Sed audiat a juvene senex, quod suo ipse exemplo juvenem docuit: nihil honestum dedecere magis quam ignominiosa sine veris adjunctis rationibus verba in quensquam projicere, ejus ad instar, cui vel vinum, vel atra bilis, vel cani, quod de mentis recto usu detraxere, lingvæ volubilitati addiderunt.

*Vasa
buccarum.*

II. *Buccarum vascula* numero parvitatem compensantia; quorum glandulæ ut in homine egregie labiorum stipantes ambitum totidem uvas referunt, vasorum ad illas nervorumque distributione figuræ gratiam augente; sic in brutis totum buccarum replent planum. In hisce, brutis scilicet, quædam in unum congestæ corpus, & inferiori maxillæ secundum longitudinem incumbentes, mediæ magnitudinis vasa emittunt, quorum ostia, in eadem recta sita, vix nisi expresso humore se produnt, etiam si semel detecta setarum non usque adeo subtilium sint capacia; ea illis in locis superficiei est æqualitas & planities. In ovibus tamen quibusdam fuscus interdum ostia prodit color: aliæ magis a se mutuo dispersæ partim buccarum tunicæ accumbunt planæ, partim in asperas & acuminatas illam elevant papillas.

*Vasa sub-
lingualia
minora.*

III. *Quæ dentium intra septum ad lingvæ conspiciuntur latera, sublingualia dicta*, & a Whartonianis diversa. In avium quarundam lingvis rara horum occurrit elegantia, ubi in ipsis lingvæ lateribus prope basin secundum eandem rectam disposita decem duodecimve ostia, si comprimatur lingua, serosi humoris totidem protrudunt gemmas. In cygno eadem stylum admittebant facile, & pro lingvæ magnitudine satis profunde, quemadmodum & in anate; fuere forte etiam in illis prædictis plura vasa, sed horum pulcherrimo adpectu abreptus ad alia non attendi. In gallo Africano vidi non modò hanc ostiorum rectam seriem, sed etiam totam tunicam, tum basin lingvæ inter & ostium laryngis, tum in ipsis lingvæ lateribus, tum sub lingvam & glandularum abscondere corpora, & vasorum ostium pertusam: reliquorum animalium lingvæ accumbunt tantum laxè &

glandulæ, & vasa, ne quidem in boum genere fetam facile recipientia, licet vaforum parallelo a glandulis ad ostia ductu incedentium elegantiam contenti exornet splendor, & ipsa expressus liquor detegat ostia.

IV. *Qvæ palati superioris tota tunica innumeris pertusa foraminibus a glandularum glomeraminibus orta recipit vasa; qvæ qvo retrorsum magis perrexeris, eo magis conspicua. Si avium rostra distraxeris, & ibi liquoris in palato superiori notabis fontes. Omne enim illud, qvod albam tunicam rostro proximam excipit, rimamque cingit undique, carneo colore conspicuum, si presseris, glandularum ostia prodet: præ cæteris notanda in ipso hujus substantiæ anteriori extremo duo puncta, per quæ magna humoris albicantis exprimitur copia, quæque vel in gallina domestica styllum admittunt non tantum in superficie.* *Vasa palati.*

V. *E naribus in palatum anteriori loco dentes intra, quibus dentes sunt, proxime descendens meatus; quem fretum si dicere placuerit, non erit e longinquo petatum simile. In brutis hic quam homine ut amplior ita & manifestior. In diversis varius apparet, quod vituli, ovis, canis, cuniculi diducta inter se conferentibus ora, dignoscere integrum. Eiusdem in avibus vice fungitur posterius palatum dividens rima.* *Meatus anterior e naribus in palatum.*

VI. *Epiglottidis cartilaginem permeantes canaliculi; qui, a carunculis epiglottidi incumbens orti, per cartilaginem transmissum humorem averfa ejus parte, quæ laryngi imminet, evacuant.* *Vasa epiglottidis.*

Non his annumerabo, quæ in variarum avium œsophago & ingluvie conspecta mihi vasa, cum ex illo perceperim, Clarissimo cuidam Viro, Anatomes quondam cultori dexterrimo, in gallina id generis ante quædam observata. In cygno œsophagi tunica innumeris perspersa punctulis totidem inde manantis aquei humoris protrudebat guttas, ingluviæ vero crassior & aspera non multo pauciores albi & viscidum fucci indicabat fontes. Sed his missis ad nares tanquam secundam contignationem adscendam.

VII. *Qvæ narium tunicam irrigant vascula; cujus humorem non ab ostiis arteriarum (natura has pro arbitrio jam claudente jam relesante) emitti, tunicæ ab osse separatae & ab inverso latere inspectæ docet examen.* *Vas narium.*

VIII. *Vas illud narium, quod non nisi in ovibus mihi hactenus notatum; cujus radices in posteriori narium parte ortæ in ramum styli capacem confluunt per narium latera versus anteriora progredientem.* *Vas narium ovibus peculiare.*

Via a palpebris in nares.

IX. Colliciae, f. punctorum lacrymalium in unum utroque in latere ductum concurfus, humorem palpebrarum in narium cava derivantes. Non exigua hic in diversis animalibus differentia. In homine ipsis ciliorum apicibus insculpta foramina breves demittunt canaliculos, nec demonstratu faciles, nisi caute diffractis narium ossibus tunicae relinquantur integrae, mox enim, ubi ossa penetraverint (quo usque tenui separantur membrana), in sinum ampliati narium continuantur tunicae. In ove, lepore, vitulo, cuniculo non in ipsis ciliis, sed interius paulo eadem reperiuntur ostia, quae profundius in avibus quaerenda, ubi, quam in ullo alio genere longe majora, receptum majorem stylum per palati rimam emittunt; brevis hic admodum, quae foramina distingvit, membrana.

Vasa palpebrarum.

X. *Vasa palpebrarum, seu lacrymalia*; quae numero plura fontium habita ratione ad duo reducuntur genera: quorum alia exteriora, externo oculi angulo accumbentia, glandulae eundem angulum occupanti debentur multis dictae innominatae; interiora alia, quam communiter lacrymalem appellant, glandulam pro fonte agnoscunt; quibus, quia nictent, data membrana, per eandem incedentium vasculorum interius hiantia continent ostia etiam in avibus stylum non excludentia.

Vasa rajae superficiei exterioris lubricantia.

XI. Liceat his adjungere, quae in raja mihi conspecta, occasione subministrante Clarissimo Praeceptore Simone Paulli. Multis illa nigris variegata maculis totidem foraminibus pertusa tegitur cute, unde viscerum humoris prodeunt guttae, si foraminibus continuas presseris strias, in quas per eadem ostia protrusa libere permeat feta.

Et haec quidem, quae nemini notata puto, vasa sunt, quorum multa sine sectione conspicua si notasset Galenus, suam *De Usu Partium* l. 2. ingeminasset interrogationem, ubi legitur: *Num igitur miraris, aut non credis, aliquid eorum, quae sunt obscuriora in Anatome, ignoratum fuisse ab eis, quibus ne ea quidem, quae ante Anatonem apparent, noscuntur?* Sed cui haec magni Anatomici probabitur exprobatio? Multa sine sectione conspicienda ignoravit Galenus, nec dubito, quin id generis alia multa superflint, quae, quod nimis forte obvia, nostram impetrare nequeunt attentionem. Bene quidem ab illo dictum, si mortalium neminem excepisset; cum vero praedecessoribus tantum suis ea objecerit, parum aequus aliorum fuisse videtur censor, nec ad angustissimos humanae cognitionis limites hoc in loco respexisse.

Vaforum ante observatorum illustrationi serviunt sequentia.

I. Lymphatica illustrat tum glandularum conglobatarum generalis fabrica, tum lymphaticorum vera in venas insertio.

Conglobatis id omnibus, quas hactenus observare datum, familiare, ut arterias præter venasque & nervos binas lymphaticorum in se contineant species, advehentem, puta, alteram, alteram evehentem; qvo a conglomeratis differunt, quibus sola evehencia contigere. Ipsa vaforum radicibus undique affusa substantia eam obtinuit conformationem, ut nulli, quam renum corpori, commodius possit comparari, cui quædam illarum, quæ figuram, dico, non colorem, similes limæ. Exterior enim globosæ, interior non quidem pelvi quadam excavatæ sunt, separationem tamen rite si aggressus fueris, inter protuberantia undique labra rimam invenies, quæ egrediuntur una cum membrana quadam lymphatici evehentis radices. In exteriori superficie, si caute cultri aciem direxeris, videbis ex diversis advehentibus lymphaticis numero multis prodeuntes ramos ipsam furculorum numerosa propagine substantiam ingredi; quod parotis conglobata in ovibus & vitulis eleganti schemate testatur. Harum glandularum respectu triplex lymphaticorum contenta sua in sanguinem reducentium exsurgit differentia; aliæ enim a primis fontibus, qualescunque illi tandem inveniendi, in glandularum sparguntur superficiem; quædam e cavo unius glandulæ in alterius gibbum pergunt; reliquæ ab harum glandularum cavo ad cavam usque exporriguntur.

Conglobatarum fabrica.

Lymphaticorum in venas insertio.

Lymphaticorum vera in venas insertio, ut multorum frustrata inquisitionem, ita nemini, quam Nobilissimo Bilfio, magis imposuit. Primus ille veram hujus sectionis videtur detexisse methodum, sed & primus se inde passus ad absurdas deduci opiniones. Alibi hæc plenius, ubi & errorum ejus manifesta dabitur causa, jam ante in meis *Observationibus* indicata, & insertionis varietas variis in figuris patebit. Hic paucis dixisse sufficiat, in venas circa axillaris jugularisque confinium utroque in latere lymphaticorum demonstrandam insertionem, & quidem in dextro eorum, quæ a dextris partibus anterioribus in brutis, ut e dextro pleuræ sacculo, pede anteriori dextro & dextro capitis latere confluunt, in sinistro vero præter dictis analoga sinistri lateris vasa, etiam ipsius, quod inferiora omnia recipit, & superioribus ante insertionem sociatur, thoracici. Communis omnium in sinistro latere confluentium concursus nec recepta

culum conficit, nec valvulis donatus est, nec, quod *Bilsius* nobis persuadere voluit, per unicum sua contenta in cavam exonerat ostium. Nunquam enim duobus pauciora, sæpe vero tria, interdum & quatuor deprehendi, &, ut certi essent spectatores, vere hac via in sanguinem infundi & chylum & lympham, vasa ita concurrentia simplici tantum pressione modo lymphæ, modo lacte replevi, inde & varia agitatione sanguini eo viam patefeci sine ulla vel vasorum vel valvularum læsione. Sed hæc paucis ante tacta, fusius alio in loco tractabuntur, una cum modis valvulas lymphaticorum detegendi. Annulus vel labyrinthus *Bilsonianus* nec in omnibus subjectis conspiciendus, nec, ubi adest, eadem semper facie conspicitur, vel quicquam est nisi lymphatici a permeantibus arteriis venisve aut nervis facta divaricatio.

Ductus
Wirtzungen-
gianus.

II. *Ductui Wirtzungiano* illustrando servit in avibus facta observatio, quæ hepatis quoque usum reddit clariorem. In variis enim, quas aperire licuit, avium speciebus geminum vidi ductum pancreaticum, ductui bilario itidem gemino (quorum alter a vesicula fellis hepatis non accumbente, ab hepate alter) concurrentem, quorum quatuor vasorum insertio tribus variat modis, vel enim in unum omnia confluunt ostium, vel cum suo quolibet pancreaticus bilario commune ostium subintrat, ita ut duobus tantum foraminibus pervium sit intestinum, vel suus cuilibet ductui concessus exitus id efficit, ut quatuor diversæ secundum eandem rectam stylo pateant in intestina viæ. Nuper in Africana gallina vidi hepaticum ductum, ubi hepate exierat, simplicem, in progressu bifidum duobus intestinum adire canaliculis, quod adeoque tribus bilem et vasculis recipiebat.

Non exiguam hæc, ut puto, lucem afferunt utriusque humoris & explicandæ utilitati & occursum mutuo confirmando, quem & illustrat pancreatici ductus in ipsum bilarium, antequam ad intestinum pervenerit, in media via insertio ovibus peculiaris, quam etiam post a diligentissimo *Highmore* jamdudum descriptam & delineatam video.

Ductus
Whartoni-
anus.

III. De *Whartoni* uno monebo, quod & me fefellerat, meas cum ederem *Observationes*: scribit, ab apposita (conglomeratæ congestæ) glandula in ipsam maxillarem inferiorem (conglomeratam) vasculum pergere, quod & ego initio ibi subsistere credidi, *Whartoni* fidens observationi, sed ulterius postmodo sectionem continuando observavi, inter dictæ maxillaris glomeramina ad conglomeratam aliam penetrare, adeoque lymphaticis *Bartholinianis* annumerandum.

Ex hisce, similibusque & aliorum & nostris observationibus frequentia partim corporis oculis subjecit experientia, partim mentis oculis ratio perspexit.

I. Lymphaticis omnibus cum glandulis commercium esse; dicerem omnium lymphaticorum primam scaturiginem glandulas salutandas, sed cum prima lymphaticorum Bartholinianorum origo, quo plures admittit explicandi modos probabiles, eo sit incertior, id saltem verum manet, nullum in corpore visum lymphaticum, quod non vel oriatur a glandula, vel in glandulam inferatur.

*Lymphæ
origo im-
mediata &
motus.*

II. Lymphatica omnia conglomeratis continua suum in certas cavitates effundere contentum, ut oculos, aures, nares, os, œsophagum, laryngem, ingluviem avium, &c.

III. Quæ conglobatis annectuntur, sua in cavam revehere contenta, vel immediate, vel mediantibus aliis conglobatis, & quidem non modo circa axillarem sinistram, cui quidem totus communiter se jungit thoracicus, sed & in axillarem dextram, quo loco vellem, monstraret nobis *Bilsius* roris sui ad dextra capitis lymphatica distributionem, seu lymphaticorum superiorum dextri lateris cum thoracico concursum.

IV. Ipsas adeoque glandulas omnes viscera esse, per quæ suas lymphatica dispergunt radices.

Et hæc quidem omnia pro veris habenda svadet ratio, quia sensuum ea probat testimonio, probabilium vero tantum numero inferendas judicat sequentes, quas ex inductione, licet non omnibus numeris absoluta, elicit propositiones.

α. Quocunque corporis animalis loco aquosus quidam naturaliter reperitur humor ejus superficiem oblinens, eandem superficiem lymphaticorum pertusam ostiis a conglomerata glandula oriundorum; unde colligere liceret, 1. eandem aquæ *pericardii* esse originem, quam *Amici Clarissimi* de thymo observatio confirmare videtur; 2. nec *sudorum* diversos inde fontes, de quibus in sudoris examine latius, ubi omnium, quæ cutem constituere possunt, partium inductione, & sudoris cum aliorum humorum comparatione, causarumque humores hosce moventium examine probare licebit, ex hactenus observatis de cute probabilius nihil dici, quam esse eam substantiam glandulosam, hoc uno a reliquis diversam, quod præter vasorum capillaria etiam pilorum radices per corpus suum habeat dispersas. Confirmant me hic rajarum cutem perforantia vasa, unde veram

lubricitatis piscium iudico expectandam causam. Quos sine cuticula generatos narrant, eorum serum credo fuisse viscidius, quam quod ad primum aëris contactum evanesceret, vel eorum cutem perpetuo sudore maduisse, ob humoris in corpore copiam, viarumve magnitudinem, aut impeditum feri per alias glandulas transitum. 3. *In ventriculis cerebri humorem simili ratione secerni, cui favere videtur ab aliis ante notata in plexu choroide glandulosa substantia.* 4. *Qui thoracis abdominisque partes oblinat, humorem originis quandam habere analogiam.* 5. *Humoris, unde & fit & nutritur fœtus, non dissimilia querenda cribra.* Quibus enim cotyledones adfunt, animalia & adhærentes utero spongiosas carnes & ex harum cavernulis extrahendas facile sine sanguine chorii radices exhibent. In fele, ubi latus ovum cingit annulus, cum annulo ovum ab utero sine sanguinis effusione separavi, eratque annuli substantia vere glandulosa, quemadmodum & ipsam uteri, cui adhærebat, superficiem asperam reddebant eminentiæ glandulosæ. Sunt & in amnio quorundam interiorius alba, quæ sanguinea vasa recipiunt, corpuscula. Sed hæc, ut dixi, suspitionum cohortibus inferenda.

β. Conglomeratarum lympham, postquam in certas e vasis effusa cavitates, non ibi subsistere, sed alio per alias vias intra corpus ablegari; sic ex auribus & oculis in nares, e naribus in os, ex ore in oesophagum, &c. Hinc patet, querendas etiam vias, per quas evacuatur pericardium, cerebrum, thorax, abdomen; liceret etiam de oculi aqveo similia suspicari. Inter querenda vias cerebri humorem excernentes collocavi; necdum enim res hæc determinata, licet apud Medicos nihil audiatur frequentius, quam a capite subiectas in partes destillare humores. Adesse in cerebro, & quidem semper, humores, frequens cerebri svadet sectio, qua vero iidem via emittantur, inventu non adeo facile. In eqvo cum pituitariam glandulam a plexibus innumeris, quibus implexa, liberarem, vidi, me stylo patulam in venas habere viam, ut adeoque in suspitionem devenerim, per pituitariam glandulam transcolatum cerebri humorem venis sine interventu aliorum vasorum recipi, sed inde per alias inquisitiones non licuit eodem fine similem repetere sectionem.

*Lymphæ
origo me-
diata.*

Ab ostiis lymphatica continuavimus ad fontes, qui ut in macrocosmo dubia creant multa, sic in microcosmo multis scatent incertis. Ex hactenus observatis deducta sequens opinio sua non videtur destitui probabilitate, quæ statuit, *glandulas cribra esse*, hoc modo cons

formata, ut, dum ex arteriis in venas per capillaria transit sanguis, liberata a sanguinearum amplexibus serosa partes caloris vi per convenientes sibi poros expellantur in capillaria lymphaticorum, concurrente nervorum extremis venis affixorum directione, elicitio per sensuum perceptionem mentis imperio subjecta.

Et hæc quidem de glandularum natura in genere dicta, quibus addantur sequentia.

I. Lacrymæ videntur esse humoris palpebras naturaliter oblinentis, *Lacrymæ.* ex glandulis per manifesta vasa eo delati, certo animi motu aucta quantitas; pari ratione ac delicatiorum ciborum præsentia salivam movet appetenti, ut non opus sit ad nervorum succum, cerebri serum, arteriarum immediatam exsudationem confugere. An, quos semel iterumque in cornea observavi non sine admiratione, porum quantum aquei humoris transmittant partem, nondum ausim affirmare: vidi quidem per poros exeuntem humorem, sed ipsius tunicæ adscribendus substantiæ, an ab inclusa aqua deducendus, non facile ante ulterius examen determinavero, cum id nunquam, nisi aliud agendo, tentatum.

II. Cum in ventriculum a fitis in auribus, oculis, naribus, ore toto & œsophago glandulis serosus semper defluat humor, interiorque *Humor ventriculi.* ventriculi crusta, si prematur, humorem exsudet, alias cocta reliqua substantia durior sit, nec ullos fibrarum agnoscens ductus veri parentis chymatis referat speciem, quis dubitabit de fontibus ventriculo serosum humorem perpetuo subministrantibus? Sed & cui non simul evidens, aliud in ventriculo solum præter reperiri calorem? Ad usum si progrediendum, ad partes vocanda Chymia; sed hic extra limites Anatomici non progrediar.

III. Lac in mammis non aliter a sanguine secerni, quam alius in *Lac.* aliis conglomeratis humor, tam diu pro rato habebam, donec, qui aliunde deducunt, suas vere descriperint vias, certisque circumstantiis confirmarint. Clarissimus Antonius Everhardi (qui non videtur attendisse, unicam se tantum de lacteis mammarum protulisse historiam, & de frequentiore illarum observatione desperasse, me vero non nisi de lacteis ad mammas loqui, cum dico, semel illi tantum vias) ad autopsiam semper provocat. Ego, quia potui attentione maxima, disenta lacte ubera subfratis a musculis separavi, sed lacte licet tumerent & mammae & chyli receptaculum, hinc tamen ad illas nullum videre potui transitum. Sed illorum recitasse historias, tan-

tum non est refutasse. Hic per thoracem a thoracico ductu, a receptaculo ille per abdomen, tertius ab utero per abdominis musculos, omnes autopsiam crepantes, chylum ad mammas deducunt.

Catarrhi.

IV. Qvi glandulas catarrhorum dixerit fontes, symptomata explicabit facile, cum caput glandulis undique oblitum. Id se docuisse licet in ultimo *De Catarrhis* tomo credi velit Clarissim. *Schneiderus*, tertium sibi repugnantem invenit, ubi ipse catarrhorum fontes membranas pronuntiat, modumque describit, quo Natura in his membranis vasorum extrema aperit, seroque emisso, iterum claudit, nulla glandularum facta mentione. Quod emendaturus ultimo tomo addit, Naturam, cum claudit vasa, glandularum uti operculo. Sed non videtur attendisse Clarissimus Vir, humoris fluxum esse perpetuum, quantitatem vero fluentis auctam & qualitatem mutatam morbos producere, adeoque hoc operculorum inventum locum non invenire, glandulasque non opercula esse, sed cribra.

Et hæc quidem de musculis glandulisque velut quædam observationum specimina sufficiant.

Non pauca neglecta hactenus, quædam etiam ἀδυνάτοις vel ab exercitatissimis Anatomicis annumerata, hic enucleata videtis. Liceret, forte non minoris momenti, alia dictis adjungere; sed quia non parum temporis requiritur ad illa, quæ promissi, præstanda, & hæc quoque vacuum ab aliis curis animum postulant, ne nominabo quidem, contentus vel hoc specimine demonstrasse, non omnia, quæ dici possunt, nostro seculo esse dicta, nec corporis tam hebetes oculos, quin multa, quorum cognitionem desperarunt multi, etiam eorum ope distincte possint demonstrari. Quod si imitari volenti prima illico subjecta dictis non visa respondere, secundum prius inspicatur, addatur & tertium, quam falsi forte non falsum accusetur. Nec enim uno hæc die observata, nec uno in subjecto visa, nec adeo acta juveniliter, ut ut juveni insultare pergat *Deusingius*, quin pleraque magni nominis in hac arte multum versatos & viros & senes habuerint visis assensum non denegantes spectatores.





DE ANATOME RAJÆ EPISTOLA





Ad
Excellentissimum
GVILIELMUM PISONEM,
Medicum Felicissimum,
DE
ANATOME RAJÆ
EPISTOLA

Vir Clarissime,

NONDUM animo meo excidit illius diei memoria, quo ad juvenis conatus Leidæ inspiciendos cum Clarissimo Sylvio tua sponte accedens ad favorem tuum acqvirendum patentem ipse primus viam monstrares. Inauspicatas inter aves corvos recenseat antiquitas, mihi sane, quam corvi aqvatici sectio, nulla unqvam instituta auspicatius, cum nihil tale sperantem votis majore commodo bearit. Qvi enim potuisssem mihi polliceri futurum, ut vir ab omnibus summe laudatus, qvi a nemine non expetitis curiosissimis ingenii judiciiqve monumentis suum æternitati jamdudum inscripserat nomen, eo se demitteret, ut non modo exercitium juvenile sua ultro dignaretur præsentia, sed & humanissimis amorem favoremqve verbis liberaliter offerret? Humanitatem illam singularem miratus sæpius, cum insuper animadverterem, prima tibi specimina non adeo displicuisse, qvin & aliis nostris experimentis Amstelodami volueris interesse, ne tanta magni favoris testimonia non agnoscere viderer, id mihi ex officio incumbere judicabam, ut me gratum, saltem litterula, testarer. Cui, ne nimis foret jejuna, cum aliam quoqve scribendi materiam desiderarem junctam, frustra qve diu

qværerem, ecce tandem commodissimam ab illo oblatam, cujus magno cum honore tuis in ædibus a te, me præsentem, facta mentio. Placuit namque Celeberrimo Viro, D. D. *Simoni Pauli*, Regio Medico & Præfato Aarhufiensi, Præceptoris Parentis loco venerando, ad rajæ sectionem 21. Martii proxime elapso me admittere, ubi cum varia visu elegantia, nec scitu saltem nobis injucunda, nos in sui admirationem abriperint, credidi, me diuturnum silentium non alias commodius excusaturum, quam si tarditatem litterarum rerum novitate compensarem.

Binæ nobis erant rajæ, ejusdem utraqve sexus, sed magnitudinis diversæ, licet earum altera, quæ minor, pro mare a quibusdam habita, quod intestini per vulvam prolapsus virgam mentiretur. Ad lancem appensarum minoris pondus decem superabat libras, cum majoris non infra triginta subsisteret; cujus etiam, majoris scilicet, transversa latitudo quatuor erat spithamarum cum semisse, unaque longitudinem, seu rectam ab extremo ori prætenso apice ad caudæ initium extensam, spithama superabat. Quadratam itaque figuram diagonalium illi denegat inæqualitas, nec vere ipsi competit rhomboidea, cum, quæ sibi æqualia, latera parallelum non obtineant situm, sed ad eundem angulum concurrant comprehendendum.

Inversam intuentibus tota undique superficies innumeris nigris perspersa maculis (ex vitro nigro globulos dixisses, ni planæ fuissent) totidem iis continuas, minus tamen, quod profundius sitæ, nigricantes ostendebat strias, quas non modo vasorum adinstar cavas, setæ per foramen, quo pertusæ maculæ, immissio arguebat, sed & vere vasa esse humorem lymphæ in conglomeratis aliorum animalium glandulis secretæ, non colore minus quam consistentia similem, per superficiem corporis excernentia, tum in ipsis contentus humor non obscure indicabat, tum humoris vitreum oculi referentis per macularum ostia expressio demonstrabat manifeste. Hunc illum esse humorem, qui lubricam reddit rajam, facile mihi largientur, qui sensibus suis credunt: si vero dicerem, me non ex hoc tantum phænomeno, sed & ex pluribus aliis, in eam devenisse opinionem, ut existimem, pisces alios lubricos omnes si non omnino similia, saltem ipsis aliquo modo analogia per cutem habere decurrentia vasa, adeoque minutas maculas quasunque per superficies piscium dispersas eo nomine suspectas habendas, iis vero absentibus alia quærenda non tincta punctula; non omnium mererer fidem, in quorundam

etiam incurrerem reprehensionem, qvi me vitio Anatomicis admodum familiari obnoxium arguerent, utpote ab unica observatione ad generalem illico conclusionem abreptum. Nigros intra ductus ferri, nigraque per ostia liqvore purissimæ adinstar lymphæ splendentem excerni, miratus fuisset, ni in ovium & ore & naribus id vidisset sæpius. Et hæc quidem sine sectione cuilibet obvia, qvæmodum & ipse striarum situs varius, qvi variis in locis elegantissimus.

Ab incumbentibus abdomini musculis instratam ipsis cutem separanti in cutem, aut saltem junctam cuti arctissime membranam, abeuntes tendinosæ quædam fibræ, ut magnam secandi difficultatem manibus pariunt, sic oculos non exiguo recreant oblectamento; transverso namque ductu se alternatim secantes pulcherrimum consiciunt plexum, vel, si mavis, telam illi non absimilem, quam in telis non usque adeo subtili textura compositis detegunt microscopia. Ad latera sectionem longius accuratiusque si continuaveris, etiam carnosas inter fibras tendinosas alias ad cutem ascendere notabis. Sic & in media pubis cartilagine se interfecant ascendentes musculorum in oppositis lateribus sitorum tendines. Obiter hæc tantum lustrata, non minus ac ipsi abdominis muscoli, quæ tamen non adeo acta perfunctorie, quin viderim & ex illis quædam, quæ me in aliis, quos secare contigit, musculis observasse, ni fallor, nosti; carneas scilicet fibras in tendinem utrinque definire, & posse in ventre musculi longo brevissimas observari carnes, numero tamen magnitudinis defectum supplentes.

Abdomine decussatim aperto elegantissimus hepatis situs in se unum nostros vertebat oculos. Ipsum colore flavo ad pallidum vergente tinctum, quod in summo abdomine sub sterno a dextris ad sinistrum patet, spatium basi sua admodum tenui occupans tribus inde lobis, velut totidem lingvis, aut dentibus Neptuni fuscina imitantibus in inferiora excurrerat ad palmæ extensæ longitudinem, uno per medium ventrem pylorum inter & ventriculum descendente, cum reliqui duo ipsa utrinque contingerent abdominis latera. Hos inter lobos duo hiabant intervalla, quorum sinistrum ventriculi replebat amplitudo, dextrum superius vesiculam fellis continebat, inferius recipiebat cum intestini portione pylorum.

Cum vero totum sinistra hypochondrii pars non possideret hepar, nec dextra lienem sibi poterat vindicare, qvi intense rubens, cum transversa summi abdominis latitudo hepate plena esset, medium

sibi locum sub medio hepatis lobo inter duo ventriculi orificia, vel, ut huic subjecto convenientius loquar, ventriculi inter amplam cavitatem & pylorum elegerat, cui stomachi angulo & membranis, & per membranas currentibus sanguineis vasis jungebatur.

Ab altero pylori latere, quem inferiora versus reflexum intestinum facit, angulus pancreati commodam præbebat sedem, quod ibi non minus, quam in altero animantium genere, suo ornatum erat ductu.

Ab ore ad anum, quæ assumpta feruntur, via quatuor, &, quod excedit, spithamas longa paucissimis inflectitur locis. Primo circa finem ventriculi, ubi angustior redditus ad pylorum ascendit, inde paulo supra pylorum, ubi versus dexteram intortum descendit intestinum, tertio in loco inguini dextro aliorum animalium respondenti, ubi sinistrorsum tendens circa spinam in recti desinit vestigium.

Lingvam in ore, ubi omnia plana, nec ulla vel ecphysis eminet vel apophysis, frustra quæres. Ori continuus sine œsophago ventriculus unam eandemque cum illo in mortuis videtur conficere cavitationem satis pro mole integri animalis vastam, ita ut amplius oris rictus, geminos simul pugnos transmittens facile, deglutientorum corporum haberi possit mensura. Crediderim tamen, carnosas fibras, quæ in faucibus crassæ admodum validæque (velut spiralis quædam linea, vel cochlearis) superius orificium ambiunt, dum sphincteris munere in vivis funguntur, ab ore stomachum parvo quodam tractu distingvere. Non tamen œsophagi nomine pars ea meo iudicio venire poterit, cum, quotquot ego secuerim œsophagi fistulas, omnes duabus contrario ductu incedentibus cochleis fuerint contextæ, ut communia alia œsophagi taceam requisita. Ut vero sit, unde conjicias, quot animantium moribus unum vivat animal, quæ visceribus suis condiderant viscera, narrabo. Major asellum minorem (*Worceſ* vocamus) sesqui spithamam longum cum solea non multo minore famelica hauserat alvo, ex minore passerem marinum præter, novemque marinos cancris mediæ magnitudinis, integram spinam nescio cujus piscis, certe asello supra nominato non minoris, excussimus. Non miror, mollem piscium ingestorum carnem hæc intra claustra, tabidæ adinstar, sensim diffluere, sed cartilagine molliores fieri, imo ipsas cancrorum testaceas crustas comminui (quod in pylori vicinia cremorem hinc inde rubore tingentes minutæ illarum particulæ non tam innuebant, quam demonstrabant), id vero mirarer magnopere, si a solo fieret calore nullius humoris interventu.

Certe interiorem ventriculi superficiem integens crusta (quæ cocta reliqua substantia firmior duriorque evadit, nec ulla certarum fibrarum prodit vestigia) nulli, quam glandularum substantiæ, mihi videtur similior, & in vivis etiam viscido quodam obducta succo, si bene prematur, ejusdem generis novum denuo succum exsudat; sed de hisce nullus hic differendi locus. Ut dextrum ventriculi orificium validus cingebat sphincter, sic sinistrum arcte adeo clausum, ut non nisi vi intruso digito pateret via.

Pylorum ultra circa intestini flexum bini ductus tunicas inter lati in interiora intestini aperiebantur, nec eodem in loco, nec in eadem recta, sed in partibus sibi mutuo e diametro oppositis, quorum pancreaticus alter, alter bilarius, intestinalis dictus, hic & xystico continuus & hepatico.

Intestini interior facies etiam sua erat intacta crusta, non tamen æque ac in ventriculo crassa. Si non dissectum inverteris, proxime sub pyloro videbis ex tunicis ejus elevatam quandam quasi fimbriam ipfissimam cochleæ referre figuram, & ad cœci usque regionem descendere, non aliter ac in cœco cuniculorum intestino sæpius amicis demonstravi. Tres in hac cochlea fibrarum series, exteriores duæ ab intestini tunica oblique ad extremam ejus oram adscendentes, intermedia una secundum longitudinem decurrens, sed nec illa recta incedit; non procul a fine hujus cochlearis laminæ videtur exterior crepido quasi nervea, ita & albicat, & in filamenta resolvitur, quæ opinor nil esse nisi fibras ejus eo loco collectas & versus inferiora intortas. Ne vero pusillum credas esse corpus, duos digitos, & quod excedit, latum est, octo in versum, uti dixi, intestinum orbibus implicans. Sic gyrorum, quos in aliis longissima faciunt intestina, vices cochleæ in brevissimo intestino sustinent gyri. Quod in his contentum cremoris instar liquidum bilis admixtionem colore prodebat. In cœco, quod breve admodum, & substantia parenchymati simile, præter viscidam interiori superficiem multis cavernulis asperæ obductam humiditatem, nihil repertum. Unde non obscura lux partis hactenus obscuræ usui videtur accedere, ut ex illis propediem elucescet, quæ Celeberrimus *Simon Pauli* de hoc intestino meditata *Quadripartito* suo brevi, Deo volente, recudendo fusc inseruit, ubi variæ & Anatomicæ, & practicæ historiæ ignobilem hucusque partem, & inertium otiosarumque, quas σημείον χάριν tantum factas dicimus, classibus adscriptam, nec inertem, nec otios

sam, sed alius, magisque necessarij muneris, quam σημείου χάριν factam eleganter docebunt.

Mesenterium hic quasi nullum, cum intestinum, cætera liberum, non nisi paucissimis in locis recipiat vasa intra membranam minimè latam procedentia, & hinc facilis ejus prolapsus, quem initio dixi piscatoribus impofuisse, ut penem crederent.

Circa imum abdominis ad spinæ latera corpus rubicundum spinam longum, digitum latum, sed minus crassum, varie sectum fissumque illi per omnia simile erat corpori, quod in avibus analoga occupat loca, quod in omnibus avibus, serpentibus, quadrupedibus oviparis atque etiam piscibus renes appellat *Harvæus*, *De Generatione Animalium*, quodque *Aristotelem* aliosque Philosophos latuisse ibidem ipse pronuntiat.

Remotis, quæ nutritioni dicata, instrumentis, generationis organa in conspectum prodire, quorum magna in hoc pari differentia, cum junior altera necdum concepisse videretur, altera grandior, ovis plena, partum non infrequentem viarum testaretur amplitudine.

Oviparum hoc animal ovis & generandis & excludendis duo distincta obtinuit organa, utroque puta in latere unum, magno partium apparatu, nec artificio minori constructa.

In ovario præter ova, quæ numero plurima, magnitudine diversa, & præter integentes ova membranas, perque membranas excurrentia sangvinea vasa, & omnia connectentes varios fibrarum plexus, etiam substantia, cui incumbunt, notanda, quam primo quidem intuitu pancreas salutare, is illi & color & mollities, dissectam vero liqore quodam crasso sangvineis striis album colorem inficientibus repletam invenies; dubito tamen, an parenchyma fuerit tabefactum, cum expresso hoc succo remanserit nihilominus membranæ accumbens ejusdem coloris solidior substantia multis vasibus instructa, quæ nulli, quam glandulosæ, magis videbatur affinis.

Licet uteri nomen, quæ mereatur pars, in qua nempe conceptio fiat & conformatio, conformatique nutritio, desideretur, pro utero tamen, licet parum commode, haberi poterit, quod ab ovario non usque adeo remotum albicans corpus figura renem imitatur, a cujus cavitate media, quæ totam fere latitudinem ejus æquat, cloacam versus uteri descendit collum satis & amplum & crassum, sursum vero ad diaphragma usque cornu ejusdem tendit, tenui admodum, ruptoque valde facili substantia conflatum, cujus verus finis neutro

in latere quærentibus se sistere voluit. Utrumque cornu flatu distensum ad diaphragma usque continuavimus, ubi liberum aer inveniēbat exitum.

Ipsū uterī hic ita distinctionis tantum gratia dicti corpus ab integre tunica liberatum dissectumque duplici constat substantia, exteriore albicante, interiore cineritia eandem fere colorum diversitatem sortita, quæ cerebri medullam a cortice distingvit. Sed nec totum, quod album, ejusdem substantiæ corpus: invenies enim fibras plurimas, ab intima tunica ad extimam latas, in medio longiores sensim versus latera decrescere, & fibras præter in lateribus præcipue aliam fibris non distinctam glandulosæ similem. Diversa diverforū uterorū colla non confluunt in unum ostium, sed suo quodlibet ornatum orificio sarcinas uterī deportant in commune utriusque receptaculum, quod alias cloacam in avibus dicunt, licet illud ab intestino separet intergerino pariete membrana.

In juniore solum, quod ovis substratum, alba sua mollitie se conspicuum reddidit, in utroque latere, plurimas ejusdem magnitudinis quasi aqua splendentes bullas sibi mutuo oppositas circa medium sui exhibens. Ipsi vero cum cornibus & collis uterī non nisi tenuissimum membranæ referebant tubulum, unde in communem caveram nam exitus stylo flatuive non magis patens, quam e caverna fursum; quæ manifeste nondum violata virginitatis claustra indicabant.

Ad maris litora, maxime cum contractis Oceani in refluxu litibus arenarum termini extenduntur, inter alia, quæ recedens unda in arido destituit, testulæ frequentes videntur figuram rectanguli oblongi exprimentes, cujus quæ longiora latera, non secus ac in sandapila, utrinque parallelogrammi extra superficiem sunt extensa. Inanes eas deprehendere quærentibus semper obvium, rarum vero ab aëre, vel aqua marina arenave diversam in tumido illarum ventre substantiam reperire, quod Clarissimo *Simoni Paulli* contigit, qui binas dictis similes, viscoso humore quasi diffluentem tabe myrtulorum substantiam referente turgidas, vidit excusso contento interiori sua superficie testarum, quæ myrtulos abscondunt, cœruleum intus colorem imitari: & has ventriculo rajæ fuisse inclusas, qui eduxerant, pro certo affirmabant. Qui animalium historiam figuris exornatam nobis dedere, dictis similem depingunt testam, cum incumbente illi ovorum racemo, voluntque, & ova rajæ ova esse, & testam rajæ uterum appellandam: quam id bene non dixero, mihi

autem cur minus videatur vero simile, rationes edam. *Miror, Rondeletium, Gesnerum, Jonstonum*, tantos viros, hæc tam leviter examinata simpliciter adeo & absolute pronuntiasse, nec ad uteri in animalium generatione diligentius attendisse usum. Qvod, qvæso, animal cum partu exclusum rejicit uterum? & qvot uteri tot sufficerent ovis, qvibus numero carentibus rajarum in utroque latere luxuriant ovaria? Sunt, fateor, in Anatomicis exercitatissimi Viri, qvibus ovum uterus est expositus, qvod si itaqve testula hæc rajæ esset ovum, ex horum sententia etiam uteri mereretur nomen. Ne vero vel fallamur ipsi, vel alios videamur fallere, omnes & ovi & uteri imprægnati perscrutemur partes, qvo pateat, an rite omnia perpenderit, qvi ovum uterum expositum dixere.

Ovi partes vel in pulli abeunt substantiam, ut albumen & vitellus, vel pullum ambiunt, ut involucra, qvorum alia ipsi animali adhærent, ut colliqvamento innatantem pullum claudens amnion, intestinis annexus vitelli sacculus, & omnia involvens chorion, alia a vasis ab omni parte libera sunt, qvæ triplicia: tenuis nempe, qvæ chorion proxime ambit, membrana, & hanc excipiens crassior alia, qvæ alba est, tandemqve omnia duritie sua tutiora reddens exterior cortex.

Et hæc quidem, qvas in ovo distinctas numeramus, partes sunt; qvibus quid turgens foetu simile possideat uterus, instituta comparatione patebit. In utero quidem & humores, unde foetus exsurgit, colliguntur, nec defunt, qvæ humores foetumqve involvunt, foetui continuæ membranæ, saltem in brutis triplices, cum allantoidem non in vaccino tantum, sed & in ovillo integram separaverim, etiam si illam se in ovillo non invenisse fateatur *Harvæus* Exerc. 68. Cum vero hæc illa non sint, qvæ uteri in viviparis veniunt nomine, satis liquet, illarum ratione id ovo non attribuendum nomen. Quid ergo residuum? Certe corticem una cum duabus membranis ab omni vasorum communione liberis, qvæ sola supersunt, nemo uterum dixerit, nisi simul id uteri solum diceret munus, ut foetum contineret, nullum præterea vel cum matre vel foetu commercium habentis, qvod esset longe infra partis artificiosissimæ dignitatem: cum solus uterus id omne viviparis præstet, qvod ab ovario, ovis ductu, ovo expectant ovipara.

Ea namqve illius substantiæ fabrica est, ut certis in locis arteriæ matris omnem ibi transfudent humorem, qvem ab ovarii calice &

oviductus incrassato, sed molli & albicante corpore accipiunt ova. Ipsum vero corpus uteri non modo idem, quod exteriora tria ovi involucria, præstat, sed &, a matre vitam habens, sensumque & motum, ut foetus, dum gestat, moderato calore fovet, ita iusto partus tempore, ad eundem in lucem protrudendum confert plurimum, qualis uteri motus in sectione vivorum animalium manifestissimus. Adde, quod omnis uterus, dum foetus gerit, ovum gestet: quod licet ovo exposito hac in parte cedat, quod ante formatum foetus non omnia, quæ foetui formando augendoque necessaria, possideat, sed eo sensim crescente nova a matre accipiat incrementa, in eo tamen simile est, quod nullum cum matris vasis habeat commercium, ut ut contrarium hactenus a plerisque creditum.

Cum itaque, quæ utero cum ovo communia, non sint ea, quorum gratia id uterus obtinuit nomen, quæ vero residua in ovo non nisi mortua quædam involucria sint nec a matre, nec a foetu vitam habentia; cum ipse insuper uterus foetui largiatur ea omnia, quæ ab ovario, oviductu, ovo accipit pullus, imo verum intra se foveat ovum, iustoque tempore foetus luci exponat, non poterit nisi admodum *καταχρηστικῶς* ovum uterus appellari.

Liquet inde manifeste, etiamsi dicta testula rajæ continuisset ovum, uterum tamen minime dicendam. Restat, disquiramus, an certa densatur phænomena, quibus evincere liceat, rajæ fuisse ovum. Si essent nobis, quæ rajarum evagandi licentiam coercerent, vivaria, brevi decideret illam controversiam autopsyia; quibus cum destituamur, merebimur veniam, si nihil, nisi quod ex datis vere colligere integrum, admiserimus. Ovaria rajæ & oviductus cum iisdem in terrestrium genere conspiciendis organis conferenti haud facile svaseris, ovum, quod, dum ovario inhæret, rotundum est, inde prolapsum tenues quatuor tenerasque etiamsi longas ecphyfes assumpturum. A quadrato non multum recedens interior ejus, quod ovario proximum, corporis cavitas quadratam testæ figuram planamque produceret forte, sed unde ejusdem testæ deduceremus ecphyfes? Nec bene conveniunt inter se historiæ; fac visum illi adhærere ovorum racemosum, quod pictura Authorum demonstrat, quid aliud inde colliges, quam piscem quendam, forte rajam, sua super id corpus effudisse ova? At e ventriculo extracta nihil omnino probant, cum patens oris rictus obvia quæque absumat. Potuisset, fateor, ejectum utero ovum hausisse mater, propriæ prolis sepulchrum, sed speciem

hoc quādam veri habet, præterea vero nihil, cum eadem evidentia liceat dicere, zoophyti quoddam fuisse genus a raja absorptum. Quousque enim vel in oviductu rajæ non reperta similis testa, vel non visa ex tali tegmine prodire rajæ proles, cum magnorum visrorum auctoritatem non temere velim convellendam, aliorum hæc deferam judicio ulterius examinanda. Suffecerit id demonstrasse, dictam testulam, si vel maxime rajæ fuisset ovum, utrum tamen rajæ minime fuisse dicendam.

Et sic quidem relicto abdomine ad ipsa vitæ penetralia ferro aperiebatur via, ubi distinctum ab integente totam cavitatem membrana pericardium desiderabatur. Totius formam, sed inversam, cordis imitabatur figura. Planum namque & illud apice caput exprimens pro cauda carnosam acceperat portionem a basi aortæ orificium separantem, laterum vero exstantes angulos baseos angulis eleganter referebat. Unus ipsi ventriculus, nec nisi una cor inter faucesque sita auricula, quam cavæ transitus hoc nomine jubet appellandam. Carnosis fibris contextum utrumque corpus cocti docuit resolutio. Quo loco arteria se in ramos findit, oris tunicæ vicina latet glandula flavo colore tincta.

Pulmonum nec clarius hic, nec obscurius, quam aliis in piscibus, vestigium. In ore interius utroque in latere quinque dehiscences rimas si inspexeris penitus, branchiarum videbis latibula ita formata, ut hausta ore aqua, his ubi emissæ fuerit portis, iisdem regredi nequeat, quod exterius supra quodlibet foramen descendens cutis illud tegat.

Jam vero quid innumeri, quibus ornatae superbiunt branchiæ, vaforum sanguineorum ordines aliud efficiunt, quam ut contentus in illis sanguis ab ambiente mutationem patiatur, sive id contingat de suo aliquid emittendo, sive recipiendo externa, sive una & eadem opera utrumque præstando. Et rem ipsam potius quam rei vel conceptus, vel verba intuentes obsecro, videant, numne eodem res tandem recidat, sive receptum cavitate ambiens eadem, qua admissum, via emittatur, sive una via ingestum egeratur alia, modo in transitu vaforum sanguineorum contingat extrema, quæ in pulmonibus asperæ arteriæ ramos ambiunt, in branchiis prominent nuda. Namque vel id saltem in respiratione certum, requiri, ut ambiens, sive id aqua fuerit, sive aër, semper novum ad vaforum feratur extrema. Bene quidem videntur agere, qui pulmones piscibus denegant, cum diversis organis diversa competant nomina:

inde tamen non sequitur, deesse piscibus, quia simile quid præsent, partem. Nec male sudent, respirationis voce caute utendum, si derivationem respicimus; cum aqua spiritus nomine venire commode nequeat. Sed cum crediderim, terrestrium vasa non magis, qui nos circumstat, crassum haurire aërem, quam vasa piscium aquam imbibere, quis scit, anne idem illis præstet aqua, quod nobis aër, subtiliora suis amplexibus contenta corpora, quæ quorundam sunt spiritus, illis largiendo, si alias largiuntur quicquam; nam si tantum recipiunt egesta, res facilis & nulli controversiæ obnoxia est.

Maximam parit difficultatem cordi denegatus alter ventriculus. Sed nec hæc, si alias rite perpendantur singula, tanti nobis erit. Demus, non omnem per branchias ferri sanguinem, certe nec renes, nec hepar, nec alia viscera omnis permeat sanguis, & toti nihilo minus eadem sanguinis serviunt massæ. Sed pressius: ut taceam embryones, quibus quid reponi possit, non me fugit, in adultis etiam, si credimus Anatomicis, a dextra in sinistram auriculam via patens aliquando reperta testatur, quibusdam in hominibus non omnem per pulmones transmitti sanguinem. Sed ne ab insolitis ad solita procedere videar, consideretur, quæso, illa sanguinis quantitas, quæ per branchias transfertur, & patebit, sufficere illam, ut cum reliquo inde sanguine in auricula concurrens ad convenientem omnia proportionem facile reducat.

Cum itaque, quem in aliis animantibus pulmones, eundem sanguini in piscibus branchiæ præsent usum, licet hæc ab illis in quibusdam discrepent, non est, quod affixam spinæ nigricantem substantiam hic ad partes vocemus, aut ad alia confugiamus diverticula. Animalium vitæ conservandæ nihil æque necessarium ac reciprocus ambientis ad sanguinea vasa accessus recessusque, quod sive fiat eo in interiora recepto (idque vel multifidis asperæ arteriæ ramis, ut in quadrupedibus volatilibusque, vel vesicarum cavitatibus, ut in ranis) sive exterius prominula branchiarum vasa lambente, eodem tandem recidit, cum pulmonum ubique præstetur munus. Non itaque, quod pulmonibus destituantur, muti vocandi sunt pisces, sed quod pulmones obtinuerint inversos, adeoque ab ambiente possint affici, etiam si illud cavitatem receptum per fistulam vandam non ejiciant. Ad sonum namque ab animalibus edendum, id tantum videmus requiri, ut per angustias transiens fluidum sonorum in ipso per obstitientia angustias offendicula transitu elidatur.

Excidisset fere visu dignissimum pupillæ operculum. Solis discum fulgentibus radiis undique coruscantem vix elegantius depinxerit *Apelles*, quam in rajæ oculo ex parte factum ab illa, quæ colores omnes animat, Natura: usque adeo & radorum, qui medium stipabant orbem, accuratissimus erat ordo, & totius disci aureus miscabat fulgor; solum hoc desiderabatur, quod integram radii non abfolverent coronam, relicto, quo iridi non minus aureæ superius operculum nectebatur, arcu. Vere namque uveæ pars erat, ideoque inversa parte more uveæ fusco colore imbuta. Miranda fabricæ elegantia, sed & mirandus magis usus. Quod a palpebris (quarum superior plane nulla, inferior vix notanda) sperare non poterat pupilla, id descriptum hic organum ipsi largitur, radios modo admittens, modo excludens pro diverso agentium internorum externorumve impulsu. Usque adeo certis agendi organis non alligata est Natura, quin diversis idem præstare munus valeat instrumentis, quod hic uvea, pulmones, intestina demonstrant. Cui non itaque vel hoc certissimum erit, organorum diversos modos quo felicius pleniusque a priori deduxerit ratio, eo minus in certis certam eam esse subjectis, nisi per experimenta rem determinaverint sensus.

Multa de re non ita magna protulisse videor: sed & pleniora eadem reddidisse, & alia addidisse plura, si, cum in manibus esset culter, incidissent eadem, quæ cultro succedens calamus desiderabat. Nec enim Clarissimo Præceptorum id erat otium, ut ad particularia omnia descenderet, nec mihi, raro piscium sectori, rajarum viscera inspiciendi unquam data facultas, ante quam eo me invitaret Celeberrimi ejusdem Viri humanitas, cui, ut cætera ejus paterna in me merita, quæ grata semper mente recolo, taceam, vel hoc solum nomine plurimum debeo, quod hic occasionem mihi suppeditaverit ea observandi, quæ, si publici forte saporis non futura, tibi saltem non displicitura, ex doctissimis simul & svavissimis tuis de itinere Brasiliensi sermonibus colligo, quorum jucundissima semper mihi erit memoria: unde non obscure perspexi, quo illius Terræ miracula scrutandi desiderio flagraveris, quantumque rerum naturalium contemplatio passa dispendium, quod, quo ibi moratus es tempore, per alias occupationes non potueris tuis ad satietatem frui votis. Quæ tua nullos cum agnoscat limites curiositas, nec rarioribus ita se addixerit, quin & in communissimis rarissima delitescere judicet, non poterit meum hæc tibi transmittendi studium jure accusari.

Fuisset vero mearum partium eo singula cultu exornasse, qvi tuum sine rubore sustineret adspectum. Sed licet urgens iter votis obstiterit, nolui tamen, usqve dum ad maturitatem pervenirent, ea sup̃ primere; cum ab honesto qvolibet idem mihi pollicerer, qvod tua certo promittit humanitas, qvæ res, non verba respicit, ubi vero etiam res opinione tenuiores, voluntatem metitur, non vires. Verbis te qvam officiosissimis salvere jubet, cujus hæc facilitati debentur omnia, Clarissimus *Simon Paulli*. Jussisset idem Celeberrimus *Bartholinus* noster (a qvo tui honorifica sæpe facta mentio), nisi sua illum prædia nobis inviderent. Vale, Celeberrime Vir, & fave

Hafn. Anno 1664.

24. April. ft. v.

Tibi addict.

NICOLAO STENONIS



DE VITELLI IN
INTESTINA PULLI TRANSITU
EPISTOLA





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AUTHOR





Ad
Celeberrimum
PAULLUM BARBETTE,
Practicum Experientissimum,
DE
VITELLI IN INTESTINA
PULLI TRANSITU
EPISTOLA

MULTA hoc seculum in Anatome protulit insolita, quæ si monstris annumeranda, numerosa monstrorum sobole non Africæ cederet Anatome. Et quidni monstra diceres, quibus tanta cum monstris affinitas? Sunt ibi, quæ omnibus merentur monstrari, movente admirationem rei novitate; nec defunt, quæ, quod a solitis Naturæ legibus deficiunt, se exhibent vere monstrosa; sæpissime vero, ubi nihil in re monstri, monstrum fingit videntis præcipitantia. Sic et ipsi multa mirantur Afri, non alio sane nomine, quam quod non ante visa omnibus judicent monstranda; interdum vero diversi generis animalia communes ad aquas confluentia jungens casus hybrida parit, ut alias aliis modis in operando a solita via deflectens Natura monstrosos illis edit partus: cum vero credita occurrentis deformitas ad primum illico adspectum terrore pavidos in fugam vertit, monstrum sæpe fingunt ipsum visum (forte nihil minus quam monstrosum) deformitate millies excedens, melancolicorum ritu & superstitiosorum, qui inanem quendam strepitum, ludentes nubium figuras coloresque, imo propriam sæpe umbram & alia levia puerorum terreculamenta nescio quibus non spectrorum prodigiorumque nominibus describunt, credulisque tanquam vere

vifa prodigia, quorum tamen longe diverfa facies, nullo negotio pervadent. Ut vero Afros & credulos fallit terror, fic Anatomicis imponit lætitia; dum vifum quoddam prima specie inſolitum, conceptæ opinioni favens vel novæ meditationi anſam porrigens, ad εὐρηκα ingeminandum illos propellit, nullo ad accuratius examen præmittendum concefſo loco. Sunt & alii nonnunquam animi motus, hic reticendi, qui multos monſtroſorum ſcriptorum reddiderunt parentes. Odioſum foret, modernis ea exemplis illuſtrare, & ab antiquitate petita qui afferret, debitam illi venerationem videretur denegare. Nec opus aliunde accerſere, quod in ſe cuilibet deprehendere promptum. Nec enim credo, quenvquam Anatomes non nimis parcum nimisve infrequentem cultorem inſitias iturum, quin, ut interdum nova quædam, quædam videt a ſolitis diverſa, fic non raro non viſa ſe vidiffe ſibi pervadeat.

Et quid mirum, ubi animalium per experimenta cognitionem inveſtigare nituntur, quos animi celeres motus velut turbine quodam actos abripiunt, multa in Anatome venditari monſtra, nunquam ab aliis, quantumvis ſedulo id agentibus, invenienda? Animus, niſi pacatus fuerit, quæ conſiderari & poſſunt, & debent, conſiderandis nullo vacabit modo; at niſi, quantum per objecti licuerit vel ſubtilitatem, vel varietatem implicitam, minima quævis notentur, prona in errorem & facilis admodum via eſt. Ut itaque magna in ſeſione omni, & circumſpecta opus attentione, ne ſua ſponte plus nimio mobiles oculos vaga mens a præſenti abducatur; ita maxima adhibenda cautio, cum quid receptæ communiter ſententiæ repugnans occurrit, ne quis exteriori ſpecie deceptus ante victoriam cantet triumphum. Me aliorum veſtigia terruere admodum, nec auſim in re inſveta meis quicquam tribuere oculis, niſi, repetito frequentius ejuſdem rei examine, alios quoque rei, de qua agitur, gnaros viſorum habuere teſtes. Quod ſi itaque in iis, quæ modo lecturus, quid offenderis monſtro ſimile, certo credas virorum in Anatome exercitatiffimorum oculis examinatum.

Ipe inter monſtra numerare cæpi, cum viderem, quod in pullo vaſis umbilicalibus ex vitello receptum ad portam deferri hactenus creditum alimentum ex ejuſdem vitelli tunica immediatè per ductum peculiarem medio inteſtinorum ductu excipi. Abſurdum multis viſum, per os nutriri pullum: quanto abſurdius, per ipſa nutriri inteſtina, maxime cum in nullo vitæ ſtatu id fieri, vel mentis unquam finxes.

rint oculi? Nam dum sine aëre in humoribus vivit animal, multi per venas umbilicales fieri voluere, & volunt etiamnum, nutritio nem; alii per solum os docent, cui innatat foetus, liqvo rem in cor pus demitti. In animali perfecto alimentorum ofcium os audit, ubi non modo solida fluidaqve per œsophagum descendunt, qvæ com munis opinio est, sed & spiritum aëreum pulmonibus æqve ac res liqvis corporis spiraculis omnibus hauriri Chymici quidam non tam suspicantur, qvam asserunt. In ægris narrant historiæ, multos odore solo ad aliquot dies produxisse vitam, nec paucis profuisse clysteres nutrientes: sed cui vel somnianti incideret, ullum vitæ statum esse, qvo in media intestina ingereretur alimentum?

Qvo itaqve peregrinum magis, magisque παράδοξον visum, eo studiosius attendendum iudicavi, ne fictum pro vero, pro naturali monstrifum venditarem, donec omne dubium metumqve omnem tolleret sibi semper constans in omnibus, qvæ consului, subjectis observatio, qvæ in sequentibus consistit.

Ut albumini sic & vitello sua est in ovo membrana, sanguineis utraqve donata vasis, qvarum, qvæ albumen includit, rupto ovo perit, altera intra abdomen recipitur, diuqve in pullo deprehendi tur, etiam post tricesimum ab exclusionem diem juxta observationes *Harvæi*. Vasa utriusqve membranæ umbilicos appellat *Aristoteles*, vultqve, qvi vitellum adit, umbilicum intestino tenui annecti: sed sive abdomen extra propendeat vitellus, sive contrahentibus se sensim abdominis involucris introsum lateat retractus, peculiarem habet, qvo mediante intestino annectitur, ductum, vasis sanguineis medium intestinum transcendentibus utrinqve stipatum, unde factum, ut sanguinea vasa tertium ductum involvendo inventioni ejus obstituerint. Vitelli tunica sacculum refert ampli ventris, sed oris admodum angusti, unde ad intestina medio fere principium eorum inter & finem loco vasculum progreditur, vasa sanguinea crassitie vix æqvans, insuper colore ligamentum simulans, ut, nisi transmissus humor pervium argueret, nervum crederes. Modus, qvo intestina subintrat, non differt a ductus pancreatici insertione: nisi quod hic eidem affigatur lateri, qvo mesenterium intestinis adhæret, vitellus autem opposito latere viam patentem inveniat. Hac via liqvefactus & in limpidum liqvo rem mutatus vitellus in intestina transfunditur de crescente sensim cum contento continente, donec tandem, omni succo exhausto, intestino adhæserit tuberculum oblongum & cavum, quod

solum semper manet vitelli vestigium, ut hujus ope etiam in adultis possit demonstrari, quo loco per intestina ingestum alimentum. Ut vero essem de rei veritate tanto certior, intestinum aperui, pressoque sacco vidi per descriptum modo vasculum tenuiorem primo liquorem effundi subsequente eum crassiore: quod cum eodem semper modo succederet tentanti, conclusi demum, hanc esse viam, qua pulli corpus vitellus subintrat, vereque in intestinis æque ac in ventriculo fieri, quam vocant, chylicationem. Sed quo pateant omnia plenius, quæ me in hujus rei examen detulit, occasionem brevibus referam.

Diu in suspenso dubium me detinuit hepatis officium, nec in hanc usque horam vel aliunde discere licuit, vel experimento videre, quæ ad illam rem certo determinandam sufficerent. Qui, quod ingenio valent, soli omnia deferunt rationi, cum sua singuli tantum non dictatorie pronuntiare videantur placita, & qua explicandi modum toto inter se qui dissident coelo, qua probandi fiduciam conveniant, non poterit quis anticipationem mentis vitans, nec ulli sectæ addictus, quam e multis opinionem ut certiore tuto assumat, facile divinare. Experimentis vero faciendis qui se totos addixere, tantum abest omne sustulerint dubium, ut opus omne multo reddiderint intricatius, dum, quas illa veritatem investigandi methodus præscribit, leges vel non observent incauti, vel gnari scientesque spernant ad arreptam semel sententiam, cui tanquam scopulo semper hærent affixi, cuncta & visa, & non visa referentes. Id quod non alia in materia elucet clarius, quam ubi de chyli via quæstio instituitur. Tandem confirmata lactis vera lymphæque via, licet rationis dubia removisse videretur experientia, multorumque experimentorum fallaciam eadem imitantium industria detexisse, hæc nihilominus mansere, quæ ancipitem redderent veritati studentem animum. Primo, quod non constaret, omnem hac via ferri chylum, cum id tantum docerent visa, ex alimentis assumptis partem per intestinorum tunicas transcolatam per lactea in cavam sursum mitti; jam vero quis spondet, reliquum omne in excrementum abiturum? Quis falsi convicit omnes illos, qui credunt, venarum id esse munus, ut non tantum ab arteriis transfusum revehant sanguinem, sed &, quicquid earum ostia subintrare aptum, una cum sanguine cordi inferant? Id quod si admiseris in omni reliquo corpore, quæ ratio intestinis simile quid denegandi? Huic dubio non minoris momenti aliud

se adjungit, quod nempe in omni animalium genere de hac eadem re non facta inquisitio. Quod si itaque invenienda animalia, quibus denegata lactea, vel si notandum vitæ tempus, quo sanguinea vasa acceptum extremis suis alimentum in jecur primo transmittant, quidni aliis etiam similia tribuenda, præcipue quousque nihil reperi-
tum, quod contrarium demonstret? Quanti hoc faciendum, licet a paucis notatum, dubium, ut alia taceam, quæ ab hoc fonte petita movere possem non pauca, solius *Harvæi* docebit exemplum, qui, quod credidit, in avium genere vitellum per vasa umbilicalia in hepar ferri, venas lacteas rejecit. Hinc *Exerc. 21.* ait: *Et si valet argumentum a ductu venarum umbilicalium (quas ad jecoris portam uno aut altero trunco terminari diximus), pullus jam eodem prorsus modo nutritur, alimento ex vitello per vasa umbilicalia attracto: quo postea chylo ex intestinis per venas mesaraicas tractucto alitur. Vasa enim utrobique ad jecoris portam terminantur, ad quam nutrimentum pariter attractum deferunt. Ut ad venas lacteas in mesenterio (quæ in pen-
natis nullibi reperiuntur) confugere non sit opus. Quæ mihi verba non levem injecere scrupulum statuenti, si in pullo id venæ munus obeunt, non in aliis facile animalibus, vel alio vitæ tempore eum illis honorem detrahendum. Hinc factum, ut nunquam ausus hepatis adversari, licet nec unquam ejus secutus fuerim partes. Tanti mihi namque fuit autoritas *Aristotelis Harvæique*, ut illud de vitelli in hepar diadosi per umbilicalia vasa tanquam certum admitterem, quandoquidem rationi non viderem repugnare.*

Cum vero in illorum historia, quid exhausto vitello de sacculo fieret, & quædam alia non magni quidem momenti, ad circumstantiarum tamen plenam recensitionem facientia desiderarem, incubanti ovis gallinæ unum subtraxi, cujus testam jam tum ruperat exitum maturans pullus.

Deductis involucris latentem prodidit vitellum abdominis tumor. Non recensebo, quæ circa modum, quo abdomen involucris obducitur, notanda spectatori, quam lectori, gratiora futura, sed mihi omnibus dicam, dum vitelli e sacculo in hepar credulus rimarer vias, non quæsitum ex eodem sacculo in intestina transitum se mihi ultro obtulisse inveniendum. Sic sæpius aliorum asserta nobis oracula sunt, donec, quantum a vero recedant, accuratius examen demonstraverit. Legeram *Aristotelis* sententiam confirmantia *Harvæi* verba, videbamque utrique faventem rationem, quo effectum, ut

ne dubitandi quidem vel minima mihi oriretur suspicio, donec totum momento quasi subverteret autopsia, quæ authrix, ut & hoc subducto tibia, hepatis tanto magis jam vacillet thronus. Cum enim foetus quilibet, cui innatat, humorem ore assumat, cum pullus albumen ore, vitellum excipiat intestinis, nullum video argumentum, quod certo demonstret, ex humoribus partem hepatis prius, quam cordi, inferri per vasa umbilicalia, licet, quæ idem speciose svadent, minime desiderentur. Nec enim partium ego ducor studio, nec hepatis unquam bellum indixi, sed id tantum ab ejus patronis operavi efficiendum, ut experimenta darent, quibus rationis confirmarent inventa. Hinc licet, datis jam manifestis & patentibus alimenti viis, vasorum umbilicalium muneri hos præfigere liceret limites, ut suo calore, forsan & per vasorum extrema transsudante quocunque demum fluido, humores nutriendo corpori tantum redderent aptos, nullos vero in corpus deferrent; dum tamen de eo, quod venarum ostia recipiunt (an sanguis tantum sit, an vero &, præter sanguinem, admota quælibet poris congrua) nondum determinata lis, eo audacius progredi, res infida videretur.

Est autem ponderis non adeo parvi quaestio, quæ disquiritur, quo modo parti corporis admota quæcunque suas in corpus transmittunt partes.

Sunt, quæ illas recipere possunt, venæ, nec defunt in multis animalibus, quibus idem munus tribuerent nonnulli, lymphatica: quod si vero volueris per poros cutis, membranarum, muscutorum, ossium ad intima penetrare viscera, vel subtilem hic tantum intelligas oportet materiam ut in actu frigidis calidisve, quemadmodum & in magneticis, vel ipsas partes, adeo vi morbi relaxatas, ut vera sit diapedasis, nisi forte ea fuerit materiae acrimonia, ut obstantia quæque, vel ferrea, perrumperet. Visa, fateor, bilis non rupto folliculo vicina loca flavo colore inquinasse, & observatum per vesicam bubulam transsudasse aquam, repertusque intra suspensam in statuariorum officina vesicam lapidum caëtorum pulvis, qui clausum arcte vesicæ orificium non facile penetrasset: sed, quod vel laxatis morbo membranarum fibris, vel eisdem exsiccatis adscribendum, locum in vivo & sano non invenit, ubi & spiritu repleta sunt omnia, & humore. Quod itaque cordialia cordis regioni imponantur epithemata, non aliam video rationem, quam quod venarum ab illa cutis parte ad cor usque extensio brevior sit, quam si manibus idem applicares,

quandoquidem, alias qui pilam purgantem manibus ægrorum jus bebat continendam, non difficilior alvum moverit, quam qui ejusdem facultatis unguentum umbilico illineret, ut adeoque & hic & ibi nulla fiat per solidorum poros penetratio, sed tantum vasis receptarum partium cum sanguine mixtio, unde speratus resultat effectus. Eadem cantharidum ratio, nec vere dicti veneni diversus modus. Sed longum foret, quæ generalis hæc quæstio involvit, omnia evolvere. Cum itaque, quæ exterius admoventur corpori, venarum ostiis recepta illarum sequantur ductum, quidni etiam, quæ membranis uteri continentur, liquida sui partem umbilicalibus offerrent? Speciosa hæc ratio, sed non ubique locum inveniens. Quis enim crederet, in renibus nuper a sanguine, aut undecunque demum, faltem ab aliis utilibus partibus secretam urinam in vesica iterum a venarum extremis reforberi? Quod alias omnino largiri tenetur, qui venis omnibus eam dederit fabricam, ut præter sanguinem admota alia, modo ingredi apta, excipiant. Quid enim urina majorem penetrandi vim possidet, quæ exterius admota suas illico exferit vires? Pari ratione de bile, de aliis excrementis liceret concludere. Quod si hic Naturæ propria excrementa abominantis fastidium objeceris, parum efficies, cum multum de prudentia ejus detraheret, si, quæ in vesica prudens adeo est, in cute tam parum cauta deprehendatur, ut, quod in vesica noluerit vasis recipere, in cute sanguini patiatur immisceri. Quod si autem oblinentem interiora vesicæ pituitam ad partes vocaveris, commo diorem videreris afferre rationem. At vero si in vesica urinaria, si in bilis folliculo, si alibi admiseris impedimenta prohibentia, ne sanguini jungatur, quod alio corporis loco penetraret libere, quis nobis interiorum membranarum foetus superficiem adeo probe cognitam perspectamque dabit, ut ausit suam libere pronuntiare sententiam? Ut autem de umbilicalibus dubia res, sic de portæ ramis parum certa veritas, tum ob datas modo rationes, tum quod non lactæe tantum lymphaticæque venæ, sed & glandulæ conglobatæ mesenterii in avibus piscibusque necdum mihi visæ, five id observantis contigerit culpa, five rei in istis animalibus defectu, quod necdum velim decernere. Quod si jam certo constaret, esse animalia, quorum intestina omnem chylum venis rubris mesenterii committerent deferendum, non posset in aliis animalibus chyli (quo nomine intelligo, quicquid ab ingestis alimentis secretum per intestis

norum tunicas exprimitur vel in lactea vel in rubra) partem hepatis denegare, nisi demonstrares, vel intimam intestinorum villosam tunicam, cujus villi in cylindro hoc tortuoso axem omnes respiciunt, vel aliam, diverso modo in diversis fabricatam, in hoc subjecto venis sanguineis mandare, quod in alio lacteis totum destinavit. Sed dubium quod est, relinqvamus dubium, donec longior dies experimenta dederit vel muneris pristini partem hepatis restituentia, vel omni chyli honore demonstrantia indignam. Licet parum ad illius faceret dignitatem, vel si omni chylo liberum permetteret transitum, quandoquidem, partes solidas (quæ vel sanguinem impellunt, vel discernendorum cribra sunt) ad sanguinem aut generandum aut perficiendum quicquam conferre, hoc seculo credere plerique desierint. Sed quo me abduxit hepar? Novam mihi & tantum non monstruosam alimenti in pullo viam tibi significare volui, simulque quæ me occasio ad eam deduxit inveniendam, quæ nude adeo se proponi non patiebantur, quin hepatis simul habenda ratio; quandoquidem vitellum in proprio sacculo contentum ambient umbilicalia, in intestina receptum portæ contingant rami, utraqve vasa cum hepate commercium habentia. Vale, Vir Celeberrime, & ama

Hafn. 12. Jun. st. v.
An. 1664.

T.

NICOLAUM STENONIS

NOTES

I

DE PRIMA DUCTUS SALIVALIS
EXTERIORIS INVENTIONE &
BILSIANIS EXPERIMENTIS.

This Letter from Steno to Thomas Bartholin, dated Leyden, April 22, 1661, is found in *Th. Bartholini Epist. Medicin. Cent. III.* Hafniæ 1667. pp. 86—95, numbered *Epist. XXIV.*

P. 3. l. 1. from top.

THOMÆ BARTHOLINO] Thomas Bartholin (1616—80), son of Casper Bartholin the elder, was born in Copenhagen. He spent nine years of study abroad and took his Doctor's degree at Basle in 1645. Shortly after his return to Copenhagen he was appointed Professor of Anatomy at the University of that town (1648), but as early as 1660, when only forty four years old, he was exempted from delivering lectures on account of his declining health. With the title of Honorary Professor he retired to his estate in the country, and from there he constantly made his strong influence on the University felt. In 1670 his estate was burned down and the whole of his library together with numerous manuscripts was destroyed by the fire. Bartholin was given many offices of trust, *inter alia* he was a Judge in the Supreme Court and Physician

in Ordinary to King Christian V. — Bartholin was an influential man of high standing in his own country, the University of which was essentially under his dominion. His reputation spread outside his native country to the whole of the then world of learning. This is accounted for partly by his personal acquaintance with most of the contemporary scholars interested in Natural Science, with whom he kept up an extensive correspondence, partly by his versatile literary activity. Adding a great many amendments, Bartholin edited his father's Anatomy; it was published several times, and, translated into many languages, it was for a long time the manual most in use in Europe. Besides, Bartholin published various large collections of letters, of medical journals and of short treatises on Natural Science, among which the collection that may be considered the first periodical of Natural Science — *Acta Medica & Philosophica Hafniensia*, published from 1673 till 1680 — was looked upon with great esteem. As an original investigator Bartholin was of less merit, though one important discovery, viz. that of the lymphatic vessels, was made by him in conjunction with his prosector Michael Lyser. The same discovery had been made, however, a very short time before by Olof Rudbeck in Upsala, yet with-

out Bartholin's knowing about it. For this subject see Gosch, *Udsigt over Danmarks zoologiske Literatur*, vol. II 1. Kjøbenhavn 1872. pp. 87-131, where the controversy into which Bartholin was led by his discovery, is fully discussed. A complete list of Bartholin's writings will be found in Gosch, vol. III. Kjøbenhavn 1878. pp. 13-61. See, besides, *Dansk biografisk Lexikon*, vol. I. p. 564. (Jul. Petersen.)

P. 3. l. 2 from bottom.

[*imilis omnino ductus*] *Ductus Whartonianus*. See *Adenographia* ... *Authore Thomâ Whartono*. Londini 1656. c. XXI p. 129.

P. 3. l. 1 from bottom.

a *Cafferio*] *Ivlü Casserü* ... *De Vocis Avditusq; Organis Historia Anatomica* ... Ferrariæ 1600. tab. V p. 27. d.

P. 3. l. 1 from bottom and p. 4. l. 1. from top.

ex tuis ... *Institutionibus*] *Thomæ Bartholini* ... *Anatomia* ... *Reformata* ... Lugd. Batav. 1651. lib. III c. XI p. 362.

P. 4. l. 4-5 from top.

a *Clarissimo Sylvio*] *Frans de la Boe Sylvius*, born in Hanau, studied at German universities. Having taken his degree at Basle in 1637 he returned to Hanau, where he lived as a medical practitioner, continuing his scientific studies at the same time; in 1638, however, he was entered at the University of Leyden as a medical student. For some time he was a physician in Amsterdam, where he made the acquaintance of Descartes, and in 1658 he be-

came professor of *Medicina Practica* in Leyden. He died in 1672 and is especially renowned for his investigations of the brain (*fossa Sylvii*), of the glands (the classification into *glandulæ conglobatæ* and *conglomeratæ*), and of physiological chemistry. See *Biogr. Woordenboek der Nederlanden*. vol. XVII p. 1142, the Introduction to the present Edition and note to [II] p. 20.

P. 4. l. 5 from top.

a ... *Dno. van Horne*] *Joan van Horne*, born at Amsterdam in 1621, studied at the University of Utrecht, travelled in Switzerland and Italy, and was afterwards made Doctor in Basle; having stayed for some time in France he eventually became Professor at the University of Leyden. He died in 1671. He made the discovery of the thoracic duct independently of Pecquet (*Novus ductus chyliiferus nunc primum delineatus*. Lugd. Batav. 1652.). See the Introduction and *Biogr. Woordenboek der Nederlanden*. vol. VIII p. 1269.

P. 4. l. 5-6 from top.

exhibitus publico ductus ille fuerat] Compare two letters from Ole Borch to Thomas Bartholin, dated Leyden March 3, and March 20, 1661, found in *Epist. Medicin. Cent. III*. Hafniæ 1667. No. LXXXV pp. 362-63 and No. LXXXVII p. 376.

P. 4. l. 7 from top.

Gerard. Blasius] *Gerard Blaes* was the son of *Leonard Blaes*, the Dutch architect to King *Christian IV* of Denmark. He studied medicine in Copenhagen and Leyden and was made Doctor at the latter place. By the time of Steno's arrival in Amsterdam he was physician at the

Athenæum there. He died in 1692. Blaes displayed a vast literary activity; his commented edition of *Vesling's Syn- tagma Anatomicum*, Amsterdam 1666, and his *Anatome Animalium*, *ibid.* 1681, are his best known publications. See the Introduction and *Biogr. Woordenboek der Nederlanden*. vol. II p. 598.

P. 4. l. 10—11 from top.

in fuis ad Eyffonium litteris] *Henricus Eyssonius*, born in Groningen, was in 1658 made Doctor and two years after Professor of Medicine at the University of his native town. He died in 1696. See *Biogr. Woordenboek der Nederlanden*. vol. V p. 311.

P. 4. l. 12—13 from top.

de *Medicina Generali* scripto] *Steno* made his discovery on April 7, 1660. The two letters mentioned above (see note to p. 4, l. 5—6 from top) of *Ole Borch's* in which the latter mentions *Blaes'* intention of claiming the right to the discovery, are dated March 3 and March 20, 1661. This letter of *Steno's* has the date of April 22; in the meantime *Gerardi Blasii* . . . *Medicina Generalis*. *Amstelædami* 1661, had appeared. In the Preface of this book the following passage is found: *In Re ipsâ vix aliquid novi, quod considerationem mereatur. Quid accesserit, facile ipse observabis, hæc nostra cum aliorum hactenus editis scriptis conferens. Vnicum hoc moneam cogor, Ductus salivales in maxillâ superiori sese exhibentes, de quibus pag. 64. mentionem feci, inventis novis accenseri deberi, utpotè antè annum, & quod excurrit, à me, privatis exercitiis anatomicis occupato, in capite vitulino primum repertos, ac dein, occasione commodâ se offerente,*

in Nofocomio Leydenfi, à Pr. Juvene Nicolao Stenonis, Hafniensi, Discipulo meo industrio, in capite humano, ante paucos menses, Spectatoribus exhibitos. The same work has, *Cap. XIII. De Salivâ*, pp. 63—64: *Saliva humor est, calidus, moderatè, & ficcus, tenuis, spumofus, albicans, dulcis, ex fero confans, caloris ope à massâ sanguineâ in glandulis maxillaribus segregato, & hinc per ductum salivalem in maxillâ superiori aequè ac inferiori notabilem; ad glandulas oris anteriores delato, ut inde motu linguæ expressus, gustationi, masticationi, deglutioni, imò ad ventriculolum delatus chyificationi inserviat.*

P. 4. l. 15 from top.

per Fratrem] *Gerard Blaes'* brother, *Joan Blaes*, was a barrister and an amateur poet.

P. 4. l. 6—7 from bottom.

Whartonum ad partes vocare] *A denographia . . . Authore Thomâ Whartono. Londini* 1656.

P. 4. l. 1 from bottom.

Dn. Jacobo Henrico Paullij Jacob Henrik Paulli, born 1637, was the son of *Simon Paulli*, the Anatomist and Botanist. Having been the prospector of *Thomas Bartholin* for some time he went to study abroad. He became Professor Designatus of Anatomy at the University of Copenhagen but was eventually appointed Professor of History; abandoning this chair he went to Holland and England as a diplomatist; he was afterwards knighted under the name of *v. Rosenschild*. See *Dansk biografisk Lexikon*, vol. XIV p. 298. (*L. Laursen*.)

P. 5. l. 2 from bottom.

in illa . . . disputatione] *Disputatio*

Anatomica De Glandulis Oris, & nuper observatis inde prodeuntibus Vasis Prima (& *Secunda*). Lugd. Batav. 1661. The defence of these dissertations took place on the 6th and 9th of July; they are to be found as No. [11] of the present Edition. See moreover List of Steno's Writings in vol. II.

P. 6. l. 12—13 from top.

[salivales glandulæ duas, interior unam, alteram exterior, sibi affocierunt] *Glandula salivæ exterior et interior*: *glandula submaxillaris* and *sublingualis*. See *Adenographia*... *Authore Thomâ Whartono*. Londini 1656. c. XXI p. 128.

P. 6. l. 16 from bottom.

tibi, ut qui primus hæc vasa detexit] Pecquet in 1649 found the thoracic duct in a dog (*Joannis Pecqueti*... *Experimenta Nova Anatomica, Quibus Incognitum Hactenus Chyli Receptaculum, & ab eo per Thoracem in ramos usque Subclavios Vasa Lactea deteguntur*... Parisiis 1651). The thoracic duct was found independently by van Horne, that published the discovery in 1652 (see note above to p. 4. l. 5 from top). Thomas Bartholin was the first who demonstrated the duct in man: *De Lacteis Thoracicis in homine brutisq; nuperrimè observatis*... Hafniæ 1652. This was followed by his discovery of the lymphatic vessels: *Vasa Lymphatica, Nuper Hafniæ in Animantibus inventa, Et Hepatis exsequiæ*. Hafniæ 1653.

P. 6. l. 11 from bottom.

a *Bilfi* partibus] For an account of Lodewijk de Bils see *Biogr. Woordenboek der Nederlanden*, vol. II p. 555 and the Introduction. *Bils* main-

tained that all the watery fluids and secretions of the body come from the thoracic duct. Concerning his controversy with Thomas Bartholin, see those of Steno's writings which follow immediately after this Letter, and furthermore Gosch, *Udsigt over Danmarks zoologiske Literatur*, vol. II 1, Kjøbenhavn 1872, pp. 117—131.

Thomas Bartholin's reply to this Letter from Steno is found in *Epist. Medicin. Cent. III. Hafniæ* 1667, No. XXV pp. 95—98.

II

DE GLANDULIS ORIS & NOVIS INDE PRODEUNTIBUS SALIVÆ VASIS.

Steno's Disputatio Anatomica De Glandulis Oris, & nuper observatis inde prodeuntibus Vasis was published in Leyden in 1661. It was reprinted in 1662 as the first of the four Treatises found in Nicolai Stenonis *Observationes Anatomicae, Quibus Varia Oris, Oculorum, & Narium Vasa describuntur, novique salivæ, lacrymarum & muci fontes deteguntur, Et Novum Nobilissimæ Bilfi De lymphæ motu & usu commentum Examinatur & rejicitur*. Lugd. Batav. 1662. The text of this second edition, which was corrected and somewhat enlarged by Steno himself, has been made the basis of the present Edition. In the following notes attention is called to any divergency of text in the two editions, unless being quite unconsiderable.

P. 11.

This Dedication is found both in the edition of 1661 and in that of 1662;

but the wording is somewhat different in the two editions. In the dedication to Otto Krag the words . . . *gravissimo, arcis & territorii Neoburgensis in Fionia*¹⁾ *Gubernatori* are only found in the edition of 1662. The last part of the Dedication runs as follows in the edition of 1661: . . . *Mæcenatibus, & Promotoribus suis obsequio æternum devinctus observationes hæc Anatomicas*

Offert

NICOLAUS STENONIS

Auth. & Resp.

P. 11. l. 2 from top.

D. OTHONI KRAGIO] Otto Krag (1611–1666), who belonged to a Danish family of ancient nobility, was at this time the Danish Ambassador to the Netherlands. He was a dauntless and intelligent man. In 1653 he had become a member of the Imperial Council of Denmark, and in the Parliament of 1660, when hereditary absolutism was being introduced in Denmark, he proved a powerful advocate of the rights of his class. See *Dansk biografisk Lexikon*, vol. IX p. 440. (*J. A. Fridericia*.)

P. 11. l. 8 from top.

D. D. JOHANNI JOH. SVANINGIO] Hans Svane or Svaning (1611–1668), an imperious and ambitious man, at the time of the session of the Parliament in Copenhagen in 1660 Bishop of the Diocese of Zealand, was a staunch promoter of the introduction of absolute government in Denmark. For his zeal in this cause he was rewarded in various ways by the King, Frederik III, e. g. by being appointed Archbishop, in which office he has been the first and the only protestant of all the divines, on whom

that title has been bestowed, the office never having been filled after his death.

P. 13. l. 7 from top.

a Protogene] Protogenes was a Greek painter from the fourth century B. C. He enjoyed a wide-spread reputation, and was especially admired for his scrupulosity as regards the execution of his pictures. On a single painting of his he is said to have been at work for seven (or eleven) years.

P. 14. l. 11 from top.

Dædalea juncturarum coagmentatio] Dædalus, a legendary personage of Greece, used to be considered the architect of any ancient building all over that country. He was also supposed to have built the famous Labyrinth at Crete.

P. 14. l. 19 from top.

Apelles] Apelles was one of the most renowned painters of the olden time. He was a friend of Alexander the Great, whom he painted a great many times; he was, in fact, the only painter, by whom the king permitted his portrait to be made.

IN the edition of 1662 and the reprint of 1680 the following poem is found after the Preface.

IN NOVOS SALIVÆ & LACRYMARUM DUCTUS.

*Dum non nota stetit tubulorum larga propago
Cæcis membra fecans gyris, quæis roscida labra
Supra infraque madent, gingivæ, lingua, cibusque
Gutturæ demissus: quæis lumina flumina fiant
Per majestas delapsa genas torrentia, quando
Mens trepidat concussa metu: quæis stillat abortis
Læsum Aquilone caput, madidique infansia nati.
Sudoris, muci, lacrymarum spissa tegebat
Umbra vias, nulli constabat fontis origo,
Qui membra ac vultum spumosi immergeret undæ.
Irrita languentum voluta tabella, nec Artis
Sat succundus erat labor, Afflimate quando calebant
Ora, movente diu stomacho fastidia tussi.
Glandula spreta [latex nam sub læve conditur illo,*

¹⁾Neoburgum] Dan. Nyborg. Fionia] Dan. Fyn.

*Divite qui venâ per totos spargitur artus/
Has turbas dedit, & doctos commisit acerbo
Sese inter bello, nunc hunc nunc mordicus illum
Usum assignantes, alii nam Tuberâ fulcra
Vasorum dicere, locum complere vacantem
Ancipites alii, nec, quis tua pagina surgit,
Argumenta valent imos referare recessus.
Candidè Varthoni, licet in penetralia missus.
Fata obstant, nomenque tuum, laudeſque perennes,
Optime Stenoni, nam primus nubila tecta,
Tecta umbroſa, angusta petis, primusque recedis
Oſſia clauſa domus, ſecretaque diſſia pandis
Iam nobis, famamque tibi, famamque repetitis.
Hic fortunatus, nec guttis grandibus oca
Humectes unquam, nec, ſi vel Neſſora¹⁾ vincas,
Pena ſenum, pũtula tuis ſit noxia membris.
Matth. Jacobi Matthiades²⁾*

P. 17. l. 1 from top.

cum convicto a Socrate *Aristodemoj Xenophon, Memorabilia Socratis* (Απομνημονεύματα) I 4, 6 f.

P. 17. l. 1 from bottom.

ἐν πορφύρᾳ πύθκων venerantes]
A proverbial saying concerning bad things and persons, whose folly shows itself, notwithstanding their splendour. See *Paroemiographi Graeci ed. a Leutsch. Gottingae 1851. II p. 614* (Apostolios XIV 32).

P. 17. l. 1 from bottom.

Silenos Alcibiadis tranſeant] *Platon, Convivium* (Συμπόσιον) c. XXXII
Φημι γάρ δὴ ὁμοίωτατον αὐτῶν εἶναι τοῖς Σειληνοῖς τοῦτοις τοῖς ἐν τοῖς ἐρ-

¹⁾ Nestor, King of Pylos, when a very old man, took part in the expedition against Troy.

²⁾ Matthias Jacobæus (1637–1688) was the son of the Bishop of Aarhus in Jutland (Denmark), Jacob Matthiæsen, D.D., who was married to a sister of Thomas Bartholin. Matthias Jacobæus in 1664, having travelled four years abroad, was appointed Professor at the University of Copenhagen, to a chair which had originally been intended for Steno. He was a brother of Jens (Janus) Jacobæus and of Steno's future pupil Holger (Oligerus) Jacobæus, both of whom became, too, Professors at the University of Copenhagen.

μογλυφείοις καθημένοις, οὐστίνας ἐργάζονται οἱ δημιουργοὶ σύρριγγας ἢ αὐλοὺς ἔχοντας· οἱ δὲ διχαδὲ διορθέντες φαίνονται ἐνδοθεν ἀγάλματα ἔχοντες θεῶν.

P. 18. l. 7 from top.

forſan & quæ non intellexi] *Diogenes Laertius II 22. Euripides* asks Socrates, what he thinks of a book of *Heraclitus*; Socrates replies: Ἄ μὲν συνέκκα, γενναῖα, ὁμαὶ δὲ καὶ ἄ μὴ συνέκκα.

P. 18. l. 15 from bottom.

cum [spongiis communia] See *Hippocrates, Περὶ Ἀδένων*. Ed. Littré, vol. VIII p. 556.

P. 19. l. 15 from bottom.

Gerardum Leonardi Blasium] The edition of 1661 here and in § 13 [p. 23 in the present Edition] has instead of Gerardum: Johannem, which was the name of *Blaes'* younger brother [see note to I p. 4. l. 15 from top]. This mistake, as being indicative of Steno's unreliableness, was much dwelt upon by *Blaes* in a long letter to *Thomas Bartholin*, dated Amsterdam July 16, 1661. See *Epist. Medicin. Cent. III. Hafniæ 1667. Epist. XLIII p. 164*. The edition of 1680, which appeared after Steno's having given up scientific studies altogether, has once more the wrong name instead of the right one in the same two places.

P. 19. l. 4 from bottom.

tam brev] These two words are not found in the editions of 1662 and 1680.

P. 20. l. 17 from top.

a Clariff. Whartono descriptas] See *Adenographia . . . Authore Thomâ*

Whartono. Londini 1656. c. XXI p. 128 and c. XXII p. 137.

P. 20. l. 17-18 from bottom.

qvas conglomeratas . . . Sylvius appellat] To the editor's knowledge Sylvius spoke of his classification of the glands, into *glandulae conglobatae* and *conglomeratae*, for the first time in a dissertation entitled *De lienis & glandularum usu*. Lugd. Batav. 1660. Immediately below Steno quotes from the second edition of this dissertation, which is found as No. V in: . . . *Sylvii . . . Disputationum Medicarum Pars Prima . . . Amstelodami 1663. Glandulae conglobatae* correspond to those now called the lymphatic glands, *glandulae conglomeratae* to the other glands then known: the pancreas, the submaxillary gland, &c.

P. 20. l. 6 from bottom.

exsurgentes] Here follows in Sylvius: *quales pancreas existunt, & thymus, &c.*

P. 21. l. 1 from top.

duo genera reperiuntur] Olof Rudbeck first discovered the lymphatic vessels, which come from the liver; these he called *ductus hepatici aquosi*. Later he found other lymphatics, and these he called *vasa glandularum serosa*. See *Nova Exercitatio Anatomica, Exhibens Ductus Hepaticos Aquosos, & Vasa Glandularum Serosa . . . ab Olao Rudbeck. Aroflæ 1653.*

P. 21. l. 3-4 from top.

contenta . . . deponant] As related in the Introduction, Steno considered the ducts of the glands then known (*duct. Wirsungianus, Whartonianus, Ste-*

nonianus) as analogous with the lymphatics of the conglobate (=: lymphatic) glands.

P. 21. l. 16 from top.

Hippocr. Lib. de Gland.] *Περὶ Ἀδένων*. 4. Ed. Littré. vol. VIII p. 558.

P. 21. l. 16 from bottom.

Zwingerus in tabulis exponit] See Hippocratis *Coi Asclepiadae gentis sacrae coryphaei Viginti Dvo Commentarii Tabulis illustrati . . . Theod. Zwingeri Bas. studio & conatu. Basileæ 1579.* p. 381.

P. 21. l. 14 from bottom.

acturum ait] *Περὶ Ἀδένων*. 7. Ed. Littré. vol. VIII p. 560.

P. 21. l. 8 from bottom.

Epidem. I, sect. 3] Hippocrates, *Περὶ Ἐνδονῶν* I 3 passim. See especially Ed. Littré. vol. II p. 660. Here and elsewhere a swelling of τὰ πρὸς τὰ ὦτα in several patients is mentioned.

P. 21. l. 4 from bottom.

Celsus Pliniusque] Celsi *De Medicina Libri VIII*, lib. VI. c. XVI. — C. Plinii *Secundi Naturalis Historiae Libri Triginta Septem*. Several places in the following books: XX, XXII, XXIII, XXIV, XXV, XXVII, XXVIII, XXIX, XXXII, XXXV.

P. 22. l. 4-5 from top.

scrofulis affectas] Ed. Lugd. Batav 1680 has: *affecta*.

P. 22. l. 19 from bottom.

pondere expreffit Dn. Whartonus] *Adenographia*, c. XVIII pp. 119-120 and c. XX p. 125. *iiiijf* = 17.6

grammes, $\text{šijš} = 9.8 \text{ gr.}$, $\text{šij} = 11.7 \text{ gr.}$,
 $\text{šij} = 7.8 \text{ gr.}$, $\text{šxj} = 340 \text{ gr.}$, $\text{ššijš} = 141$
 gr. , $\text{ššij} = 125 \text{ gr.}$

P. 22. l. 3 from bottom.

qvinti paris ramus durior] *Nervus facialis*. See Thomæ Bartholini *Anatomia . . . Reformata*. Lugd. Batav. 1651. Libellus III p. 454: . . . unde Galeno alii nervi molles, alii duri . . . Omnes vero partes motum voluntarium habentes duriores accipere nervos, quia durum ad agendum est magis aptum, molle ad patiendum.

P. 23. l. 9 from top.

Gerar. Leon. Blasio] See note to p. 19. l. 15 from bottom.

P. 24. l. 3 from top.

Cafferius [scribit] See note to p. 3. l. 1 from bottom.

P. 24. l. 4–5 from top.

Præfidem in suis ad Vesalium commentariis] A. v. Haller (*Bibliotheca Anatomica* l. Tiguri 1774. p. 434) while mentioning the writings of van Horne, says with regard to this passage in Steno: *Commentarius in Vesalium, Stenonio dictus, undique periisse videtur.*

P. 24. l. 13 from top.

qvi ad expressionem parum facit] Ed. Lugd. Batav. 1661 has *qvæ* instead of *qvi*.

P. 24. l. 19–20 from top.

in prima . . . disputatione] *Disquisitio Anatomica De Ductibus Salivalibus Prima Quam Sub Praesidio Ioannis van Horne . . . Proponit Iohannes Nyck . . .* Lugd. Bat. 1656. § V. (In *Disputationum Anatomicarum Selecta-*

rum Volumin I Ad Chylificationem Collegit, Edidit, Praefatus Est Albertus Haller. Gottingae 1750.)

P. 25. l. 3 from top.

conglobata glandula] The word *conglobata* is not found in Ed. Lugd. Batav. 1661.

P. 25. l. 4 from top.

Whartonus observavit] Ed. Lugd. Batav. 1680 has *observavit*.

P. 25. l. 14–15 from top.

glandulae huic tribuuntur] *Adenographia*, c. XX p. 127.

P. 25. l. 16 from bottom.

ab hoc oriundi] These words are added by Steno, or rather, *ab hac oriundi*, as all the editions have it.

P. 27. l. 13–15 from top.

Sed & . . . videntur] These two lines are not found in Ed. Lugd. Batav. 1661.

P. 27. l. 13 from top.

apud Aquapendentem] See *Opera Chirurgica Hieronymi Fabricii Ab Aquapendente . . .* Francofurti 1620. Pars II lib. II c. XXXI *De Vulneribus Genarum*. p. 901 . . . *sed versus aurem foraminulum angustissimum vix oculis conspicuum, apparet, per quod, potissimum ubi patientes madunt, tanta copia exit limpidae aquae, quæ est veluti lachryma ab oculis emissæ, & durat aliquando unum, aliquando duos menses. Unde, & quo modo effluat, ego certe nescio . . .* (The original edition is printed in Paris 1613 [?]).

P. 27. l. 17–18 from bottom.

ostiis per tunicam hiant] These are the minute ducts, which are now

called *ductus Rivini*. Rivinus described them in a corollary to his *Disputatio de dyspepsia*. Lipsiæ 1678. (*Haller, Bibliotheca Anatomica* I p. 649), reprinted in *Augusti Quirini Rivini . . . Dissertationes Medicæ Diversis Temporibus Habitæ* . . . Lipsiæ 1710, p. 425. — The last discovered of the greater ducts of the salivary glands, has first been described by Caspar Bartholin, Thomæ filius, in *De Ductu Salivali Hactenus non descripto Observatio Anatomica*. Hafniæ 1684.

P. 27. l. 1 from bottom.

Adenogr. c. 22.] Cap. XXII pp. 142–143. P. 143: Concludo igitur, salivam proprie significare debere, liquorem per ductus salivales effusum; sputum tussi rejectum, excrementum pulmonum; humorem e naribus & supra palatum, pituitam cerebri; verum mucum tonsillarum, materiam illam, quæ per tonsillas, de quibus nunc agimus, excernitur.

P. 28. l. 4 from top.

Schneideri De Catarrhis] Conradi Victoris Schneideri . . . Liber De Catarrhis Tertius . . . Wittebergæ 1661. sect. II. c. III. p. 501. P. 503: Illa membrana, quæ additamentum offis Occipitis in ultimo palato involvit, illa, inquam, pituitam condit, continet & emit. — Schneider was the first who spoke against the then generally adopted theory that the mucus of the nose, the mouth and the throat had its origin from the brain, from where it passed down through the minute holes in the bones of the skull. Schneider maintained that the mucus originated from the membrana pituitaria anterior and posterior (the mucous membrane of the nose and the upper part of the throat) and was

formed by a sort of exudation from the arteries of the mucuous membranes.

P. 28. l. 7 from top.

foraminulis] Ed. Lugd. Batav. 1680 has *foraminibus*.

P. 31. l. 8 from top.

raram . . . historiam refert] *Thomæ Bartholini Historiarum Anatomicarum Rariorum Centuria III. & IV.* Hafniæ 1657. Cent. III hist. LXXVII p. 152: *Ptyalismus singularis*.

P. 31. l. 16 from top.

non poterunt non] The latter non is not found in Edd. Lugd. Batav. 1662 and 1680.

P. 31. l. 10 from bottom.

De Morbis a Serof. Coll.] Selectiorum Observationum Et Consiliorum De Prætervisis Hactenus Morbis Affectibusque Præter naturam ab aquâ, seu ferosâ colluie & diluie ortis Liber Singularis. Avthore Carolo Pisone. Ponte Ad Monticvium 1618. sect. I theor. 4. pp. 34–35. — P. 35: Quæ si vera sunt, ut sunt verissima, certè concludere est caput esse veluti labrum seu castellum natum distributioni aquæ in varia membra eius vsus indiga.

P. 31. l. 8 from bottom.

sect. 2. part. 1. c. 2.] *ibid.* pp. 39–41.

P. 32. l. 7 from top.

A cerebro alii] As to the theories most current at the time of Steno concerning the genesis of the saliva and other secretions, the reader is referred, in addition to the notes to vol. I p. 28. l. 4 from top, to Wharton's *Adenographia*, partly to the introduction, partly to

chapters XXI and XXII, especially pp. 136 and 144.

P. 32. l. 8 from top.

Nobil. *Bilsius*] In a pamphlet printed in Dutch in 1658, but soon translated into Latin under the title *Dⁱ Ludovici De Bils Toparchæ in Koppenſdamme, Bonem, &c. Epistolica Diſſertatio: Qua verus Hepatis circa Chylum, & pariter ductus Chyliferi hactenus dicti uſus, docetur*¹⁾ Bils had maintained that the view adopted on the basis of the discoveries made by Pecquet, van Horne and Th. Bartholin concerning the function of the chyle and the thoracic duct, was erroneous. Bils asserted that the chyle was conveyed to the liver by the venæ mesaraicæ mixed with blood and that the thoracic duct, which he called ductus roriferus, only carried lymph, which was led from there direct all over the body in small canals, to appear as tears, saliva etc.

P. 32. l. 9 from top.

Anton. *Deusingius*] Deusing, who had never made any anatomical investigations himself but was a man of extensive reading, sided with Bils in the long and troublesome quarrel, which arose through Bils's pamphlet mentioned above; a quarrel in which Bartholin joined with ardour and in which Steno, too, was involved for a time. In his *Exercitationes Physico-Anatomicæ, De Nutrimenti in Corpore Elaboratione. Vbi De Chylificatione, & Chyli Motu; Sanguificatione; Depuratione Aliment;*

¹⁾ This pamphlet is found (pp. 20–23) in: *Epistola Apologetica Ad Magnum Th. Bartholinum Regium in Regiâ Hafniensi Professore Anatomicum Coryphæum De Calumniis Nobiliss. Ludovico Bilsio à Coppenſdamme, Bonem, &c. Do . . . Impactis . . . Roterodami 1661.*

Itemque Spiritibus. Quibus adjecta appendix in qua examini ac judicio aliorum subſciantur variæ de chyli motu et nutrimenti in corpore elaboratione nec non de admitanda anatome nobiliss. viri D. Ludovici de Bils. Groningæ 1660, Deusing asserted, that the saliva had various sources. The greater part of the saliva was, according to him, the watery fluid which came from the larger salivary glands through their excretory ducts, and which was first conveyed to the glands from the ductus roriferus through certain ramuli roriferi; but moreover the saliva consisted of the more watery part of the serum, which through small arteries was exuded into the mouth; and lastly of a watery matter which passed from the brain through the foramina in the sphenoid bone to the glands mentioned above or direct into the mouth. — Steno's reference to Deusing here, and again in § 42. (vol. I p. 42 of the present Edition) called forth a pamphlet from Deusing: *Vindiciæ hepatis redivivi*, 1661, to which Steno replied with his Treatise *Responsio Ad Vindicias Hepatis Redivivi in Observationes Anatomicæ . . . 1662* (No. IV of the present Edition. vol. I p. 61. See the introduction to the notes to it).

P. 32. l. 13 from bottom.

μήτε ἀπομύττεσθαι] *Xenophon, Institutio Cyri* (Κύρου παιδεία) I 2, 16: *Ἀσπρὸν μὲν γὰρ ἔτι καὶ νῦν ἐστὶ Πέρσαις καὶ τὸ ἀποπτέειν καὶ τὸ ἀπομύττεσθαι, καὶ τὸ φέσσης μεστοὺς φαίνεσθαι.*

P. 32. l. 10 from bottom.

ἐστὶν κρίσις] *Hippocrates, De Dieta* (Περὶ Διαιτήσεως) III 70. Ed. Littre. vol. VI p. 608.

P. 33. l. 7 from bottom.

Spiritus aquæ & oleo jungi poterit] On several chemical terms mentioned in the sequel and elsewhere in Steno's writings, information is to be found in *Totius Medicinæ Idea Nova, Seu Francisci Silvii De Le Boe . . . Opera Omnia . . . Accessere Chymia . . . Parisiis 1671*:

Lib. II. p. 287. 11. Spiritus à volatilitatis similitudine, quam cum Mercurio habet, dictus Mercurius vocatur vulgò Chymicis quicumque liquor activus penetrans purgativus ut spiritus vini rectificatus, spiritus salis nitri; specialiter tamen spiritum vocant illum qui ex rebus fermentatis paratur, ut est spiritus absynthij, rosarum, cardui benedicti; maxime tamen propriè spiritus appellari debet, quidquid est summe volatile in rebus, adeo ut ejus notio in rebus solà volatilitate consistat; atque hoc modo reperitur triplex spiritus, insipidus, sulphureus & salinus.

P. 287. 12. Sulphur vocatur quidquid est inflammabile . . .

P. 287. 13. Sal dicitur quidquid potest incinerari & est acre, estque duplex fixum & volatile; utrumque respectu ignis sic dicitur.

P. 290. 13. Menstruum Chymicis dicitur liquor habens vim corpus aliquod solvendi, sic dictum, quia plerumque per menstrum Chymicum, id est 40. dies cum corpore solvendo in digestionem ponitur, quo tempore corporis fit solutio . . .

P. 303. 23. Spiritus nitri. p. 307. 32. Butyrum antimonij. p. 308. 35. Bezoardicum minerale. p. 312. 45. Oleum tartari per deliquium. p. 324. 56. Aqua fortis.

P. 34. l. 10—11 from top.

Mercurii mobilitas . . . impedita]

This may refer to *Basilius Valentinus's* having discovered that spiritus vitrioli (sulphurous acid) discharged mercurium from a solution of perchloride of mercury, or to the current belief that mercury solidified when poured into boiling linseed oil.

P. 34. l. 18 from top.

parum spiritus volatilis, & minimum salis lixiviosij] *De Lienis & Glandularum Usu* (dated March 13, 1660) is found as Disp. V in *Disputationum Medicarum Pars Prima*. Amstelodami 1663. See p. 72. — Spiritus volatilis = volatile matter. Sal lixiviosum = alkaline salt. See the note above to p. 33. l. 7 from bottom.

P. 35. l. 5—6 from top.

hanc πανσπερμίαν] A conception which is frequently mentioned by Aristotle. See, for instance, *De Generatione Animalium* (Περὶ Ζῴων γενέσεως) lib. VI c. 3: . . . εἰσὶ γὰρ τινες οἱ φασὶ τὴν γοῆν, μίαν οὖσαν, οὖον πανσπερμίαν εἶναι τινα πολλῶν.

P. 35. l. 11—12 from top.

negans argumentatio] The editions Lugd. Batav. 1662 and 1680 have *negativa*.

P. 35. l. 17—18 from bottom.

D. Olao Borrichio] Ole Borch (1626—1690), son of a clergyman, was born in Nørre-Bork in Jutland (Denmark). In 1644 he entered the University of Copenhagen, going in for the study of Anatomy, Botany, Chemistry, Philosophy, Philology and Poetry. From 1650 he was an usher in Vor Frue Skole (Our Lady's School), where he was Steno's teacher; and from 1655 and five

years onward, as well as later, he was the tutor of the sons of Joachim Gersdorf, the Lord High Steward of Denmark. He distinguished himself when taking part in the defence of Copenhagen in 1659, and immediately after he was appointed Professor of Philology, Botany and Chemistry. He went abroad for six years, visited Holland, where Steno met him, England and France, became Doctor in Angers in 1664, and was then afterwards in Florence and Rome. Having returned to Denmark in 1666 he became *Medicus Regius* and founded the *Collegium Medicarum* (generally called Borchs Kollegium) for sixteen undergraduates. — Ole Borch was a most capable and learned man, who enjoyed a great reputation among his contemporaries, especially, perhaps, for his works on philology and poetry; but his studies in chemistry are of great merit, too. Besides numerous chemical treatises in *Acta Hafniensia* Ole Borch composed two books on the history of chemistry: *De Ortu, Et Progressu Chemiæ Dissertatio*, Hafniæ 1668 and *Hermetis, Ægyptiorum, Et Chemicorum Sapientia* ... Hafniæ 1674, and one on practical chemistry: *Doctrinæ Metallica*. Hafniæ 1677. In medical science, too, Ole Borch was a man of great ability. See *Dansk biografisk Lexikon*, vol. II p. 500 (*H. F. Rørdam, M. Cl. Gertz, S. M. Jørgensen, Jul. Petersen.*).

P. 35 l. 6—7 from bottom.

quæ σύγκρισιν rerum & διάκρισιν admittunt] Σύγκρισις and διάκρισις (composition and separation) are the technical terms for the explanation of the coming into being and the passing away which was given by Democritus

(the Atomists) and Anaxagoras. In the ancient philosophy the colours are generally explained to be mixtures of the primary colours (*Aristotle* and his School).

P. 36. l. 1 from top.

bezoardicum minerale] Bezoardicum minerale means the precipitate obtained by the adding of nitric acid (*spiritus nitri*) to trichloride of antimony (*butyrum antimonii*).

P. 36. l. 7 from top.

de Bennetti experimento] See *Theatri Tabidorum Vestibulum ... Per Christoph. Bennetium*. Londini 1654. c. III pp. 10—15.

P. 36. l. 7—8 from top.

quod Pecquetus in sero observavit] See *Ioannis Pecqueti ... Experimenta Nova Anatomica ... Eiusdem Dissertatio Anatomica De Circulatione Sanguinis, Et Chyli Motu*. Parisiis 1651. c. II p. 5.

P. 36. l. 18—19 from top.

nifi Democritus forte aliquis] About the capability of the famous Greek philosopher Democritus (born in 460 B. C.) of seeing through everything all that was concealed from other people, many legends are found in ancient history; his fame increased through the Middle Ages when he was looked upon nearly as a sorcerer.

P. 36. l. 19—20 from top.

lac virginis] By *lac virginis* Steno most likely meant tincture of Benzoes (*Boerhave*). In *Libavius lac virginis* is an opalescent solution of sugar of lead.

P. 36. l. 19 from bottom.

[lac tithymallorum, lac cichoreaceorum] The juice of certain plants belonging to the *euphorbiaceæ* and *compositæ*.

P. 37. l. 10 from top.

[de fucco benigno & chylo pro-pinqviore] See *Novus Et Genuinus Hominis Brutique Animalis Exortus*. Authore *Anthonio Everardi*. Medioburgi 1661. p. 18.

P. 38. l. 18—19 from top.

[*Spicileg. de Vaf. Lymphat. I. c. 7.*] *Thomæ Bartholini . . . Spicilegium Ex Vasis Lymphaticis . . . Hafniæ 1655. c. VII p. [4].*

P. 38. l. 17 from bottom.

[*De Circulat. Sangv. & Chyl. Mot. c. 5.*] See *Dissertatio Anatomica De Circulatione Sangvinis, Et Chyli Motu*, c. V p. 40. This treatise constitutes the latter part of *Experimenta Nova Anatomica . . . Parisiis 1651.*

P. 39. l. 12 from bottom.

[ex *Cl. Sylvii fententia*] See *Disputationum Medicarum Pars Prima*. Amstelodami 1663. Disp. V p. 66.

P. 39. l. 7 from bottom.

[*De Nat. Deor.*] *Cicero, De Natura Deorum*, I 1, 1.

P. 41. l. 9 from top.

[quod & *Cl. Whartonus* obfer-vaffe videtur] *Adenographia*, c. XXI pp. 130—131. See also the present Edition vol. I p. 188. III.

P. 41. l. 19 from bottom.

[*Hunc enim ad locum*] Hence to

. . . *stylo concesserit* p. 42. l. 11 from top is not found in Ed. Lugd. Batav. 1661.

P. 43. l. 18 from top.

[*Et hic ille chyli motus*] This passage runs as follows in Ed. Lugd. Batav. 1661: *Et hic ille chyli motus, quem sibi demonstrari in Spicilegio secundo D. Bartholinus cupit.*

P. 43. l. 19 from top.

[in *Spicilegio Secundo*] See *Th. Bartholini Spicilegium Secundum Ex Vasis Lymphaticis*. Hafniæ 1660. c. VII *Ludovici de Bils nova experimenta ventilantur*. p. 33.

P. 43. l. 19—20 from top.

[in *Responsione*] *Th. Bartholini Responsio De Experimentis Anatomicis Bilsianis Et Difficili Hepatis resurrectione*. Hafniæ 1661.

P. 43. l. 18 from bottom.

[in *Epistolica Differtatione*] See note to vol. I p. 32. l. 8 from top.

P. 43. l. 17 from bottom.

[*voluit demonstrare*] See Letter from *Ole Borch* to *Th. Bartholin*, dated Leyden March 3, 1661, in *Epist. Medicin. Cent. III.* Hafniæ 1667. Epist. LXXXV p. 364.

P. 44. l. 5—6 from top.

[*illum dignoscere potuerint*] See Letter from *Ole Borch* to *Th. Bartholin*, dated Leyden March 31, 1661, in *Epist. Medicin. Cent. III.* Hafniæ 1661. Epist. LXXXIX p. 382.

P. 44. l. 7 from bottom.

[§ 45] There is no section bearing the

No. 45 in any of the editions. This, as well as other mistakes in the numbering of the sections, has been corrected in the present Edition; so from this place onward the numbers of the sections do not correspond to those of previous editions.

P. 44. l. 5 from bottom.

Henrico a Mőinichen] *Henrik a Mőinichen* (1631–1709), graduated in Copenhagen in 1650 and studied abroad for some time, especially anatomy. He was patronized by *Th. Bartholin*, and after his return he was offered the chair as Professor of Anatomy at the University of Copenhagen. He rejected this offer, however, and was appointed Physician of the Royal Household. See *Dansk biografisk Lexikon*, vol. XII p. 39 (*G. L. Wad*).

P. 45. l. 3 from bottom.

colore adhuc tincto] *adhuc* is not found in Edd. Lugd. Batav. 1662 and 1680.

P. 46. l. 8 from top.

lympa etiamnum tumerent] *etiamnum* is not found in Edd. Lugd. Batav. 1662 and 1680.

P. 46. l. 9–10 from bottom.

propelleretur lympa] *lympa* is not found in Ed. Lugd. Batav. 1661.

P. 46. l. 6–7 from bottom.

Antonius Everhardus] *Anthony Everaerts* was a physician in Middelburg in Holland. See *Biogr. Woordenboek der Nederlanden*, vol. V p. 243. As to the title of the book quoted see note to vol. I p. 37. l. 10 from top.

P. 47. l. 2 from top.

ad mammas lactis] These words are not found in Ed. Lugd. Batav. 1661.

P. 47. l. 8 from bottom.

nifi forte] Hence to . . . *effent concipiendæ* l. 6 from bottom is not found in Ed. Lugd. Batav. 1661.

P. 47. l. 3 from bottom.

facta partim vidi] The word *partim* is not found in Edd. Lugd. Batav. 1662 and 1680.

P. 48. l. 5 from top.

§ 51] Section 51 is not found in Ed. Lugd. Batav. 1661, but is added in Ed. Lugd. Batav. 1662 as § 52.

P. 48. l. 11 from top.

Pag. enim 282] In *Novus Et Genuinus Hominis Brutique Animalis Exortus*, Medioloburgi 1661.

P. 49. l. 19 from bottom.

ut thef. 47. exposui] i. e. § 47. in the present Edition.

P. 49. l. 13 from bottom.

inde] Ed. Lugd. Batav. 1661 has *unde*.

P. 50. l. 1 from top.

COROLLARIA] This Corollary appears only in Ed. Lugd. Batav. 1661.

P. 50. l. 5–6 from bottom.

qvæ Clar. Schneiderus . . . proponit] See note to vol. I p. 28. l. 4 from top.

III

VARIÆ IN OCULIS & NASO OBSERVATIONES NOVÆ &C.

This Letter from *Steno* to *Thomas Bartholin*, dated Leyden September 12, 1661, is found in *Thomæ Bartholini Epist. Medicin. Cent. III. Hafniæ* 1667. Epist. LVII p. 224.

P. 55. l. 3 from top.

itineri debetur] *Steno* had been on an excursion in Holland from July 27 to August 14, 1661, in the company of *Ole Borch* (see Introduction and note to vol. 1 p. 35. l. 17—18 from bottom). *Jørgen Hasebard* (see the following note) and a couple of foreign students. On this trip he made the acquaintance, amongst others, of *Peder Schumacher* (see Introduction and *Dansk biografisk Lexikon*, vol. XV p. 371) and of *Borri* who is mentioned below.

P. 55. l. 6 from top.

reduximus *Hasebardum*] *Jørgen Hasebard*, the son of the Bishop of Viborg (Denmark), *Wichman Hasebard*, matriculated at the University of Leyden, September 14, 1661, and was styled *pol. et hist. stud.* He died in 1670 as *Professor Designatus* of Odense Gymnasium (Denmark).

P. 55. l. 6—7 from top.

Walgestinium . . . offendimus] *Thomas Rasmussen Walgensten*, born on the isle of Gothland, studied mathematics at the University of Copenhagen and was for many years, until his death, the editor of an almanac. He is found to have matriculated twice at the University of Leyden (1657 and 1669), so it was during his first stay in Holland that *Steno* made his acquaintance. In

1670 he became Inspector of the King's Model Chamber in Copenhagen, being at the same time entrusted with the superintendence of the erection of public buildings in that city. Among other works he took part in the equipment of the Large Room in The Great Royal Library. He died in 1682 as Commissioner and Provincial Judge on Gothland during the Danish occupation of that island. See *Dansk biografisk Lexikon*, vol. XVIII p. 218 (*G. L. Wad*).

P. 55. l. 10 from top.

Burthi auxilio] *Giuseppe Francesco Borri* (1625—1695), a native of Milan where his father, himself a member of a renowned family, practiced medicine. He was educated at the College of Jesuits in Rome, and afterwards entered the service of the Papal Court; but when, an enthusiast and a mystic, he endeavoured to establish a sect of his own, he had to leave Rome for Milan to escape the Inquisition (1655). However he kept on working to found a new church and a new state, the supreme head of which he was to be, so at last an action was brought against him in Rome, and he was burned in effigy. Already during the lawsuit he had fled to Holland (1659) and for several years lived in Amsterdam, where he studied chemistry and alchemy, enjoying a great reputation as a physician. In Holland he made the acquaintance of many prominent Danes, among others of *Ulrik Frederik Gyldenløve* and *Hannibal Sehested*, and through them he may have heard about the interest taken by the King of Denmark, *Frederik III*, in the science of alchemy. At any rate he went to Copenhagen in 1667, where he stayed

for three years till the death of Frederik III, and was highly esteemed, both as an alchemist and as a physician. In 1670 he set out for Constantinople, but, while on his way, he was captured and conducted to Vienna, where he was surrendered at the request of the Papal Nuncio. The action against him was renewed, and in 1672 he was sentenced to be imprisoned for life. He died in 1695 in the prison of the Castle of Saint Angelo in Rome. See *Biographie Universelle*, vol. V p. 96 and *Dansk biografisk Lexikon*, vol. II p. 543. (Chr. Bruun).

P. 55. l. 11 from top.

Vindicias illius] See note to vol. I p. 32. l. 9 from top, and the introduction to the notes to IV in the present Edition.

P. 55. l. 11 from bottom.

eum *Bil's*io favere] On *Bil's* see Introduction. Steno here refers to what he has written about Deusing's position toward *Bil's* doctrine in his *Disputatio Anatomica De Glandulis Oris* ... Lugd. Batav. 1661, theses 25 and 42 (vol. I p. 32 and 42 of the present Edition). With regard to this matter as well as to the remainder of the Letter, see also Steno's reply to Deusing: *Responsio ad Vindicias Hepatis Redivivi* (vol. I p. 61 in the present Edition).

P. 55. l. 3 from bottom.

occasionem *Exsequiarum Hepatis*] Thomæ Bartholini *Vasa Lymphatica*, Nuper Hafniæ in *Animantibus inventa, Et Hepatis exsequiæ*. Hafniæ 1653.

P. 55. l. 2 from bottom.

Spicilegium tuum] Thomæ Bartho-

lini ... *Spicilegium Ex Vasis Lymphaticis* ... Hafniæ 1655.

P. 56. l. 1 from top.

in *Spicilegio Secundo*] Th. Bartholini *Spicilegium Secundum Ex Vasis Lymphaticis* ... Hafniæ 1660.

P. 56. l. 2—3 from top.

in hoc cardine ... *verfari ais*] See Th. Bartholini *Spicilegium Secundum*, c. VII p. 37: *In hoc cardine fasus observationum nostrarum voluitur*.

P. 56. l. 6—7 from top.

in *Epistolica Differtatione*] See note to vol. I p. 32 l. 8 from top.

P. 56. l. 12 from top.

habebis] Steno sent his *Observationes Anatomicae* ... Lugd. Batav. 1662 to Th. Bartholin with a letter dated Leyden January 9, 1662, new style. It is found in Thomæ Bartholini *Epist. Medicin. Cent. III*. Hafniæ 1667. p. 262 as Epist. LXV and appears as No. VII in the present Edition (vol. I p. 101).

P. 56. l. 19 from bottom.

a Clariss. Borrichio ... *significatam existimem*] See Letter from Ole Borch to Thomas Bartholin in *Epist. Medicin. Cent. III*. Epist. XCIII p. 401.

P. 56. l. 18 from bottom.

cum *Tractatu de Glandulis Oculorum*] Steno's *De Glandulis Oculorum* ... dated Leyden December 6, 1661, is the third Treatise in his *Observationes Anatomicae* ... Lugd. Batav. 1662, and it appears as No. V in the present Edition (vol. I p. 79).

P. 57. l. 7—8 from top.

illam ... *diversitatem non invenij*

This refers to *Bils' Epistolica Dissertatio*, where *Bils* gives a description of his method. See, moreover, *Steno's Responsio Ad Vindicias Hepatis Redivivi* (IV vol. I p. 64 in the present Edition).

P. 57. l. 18—19 from top.

ductum . . . continuum effe] See Letter from *Steno* to *Th. Bartholin* in *Epist. Medicin. Cent. III.* Hafniae 1667. Epist. LXV p. 264 (VII vol. I p. 102).

P. 57. l. 5 from bottom.

[fit feriaturus] *Bils* never replied to *Steno's* criticism.

P. 58. l. 1 from top.

Clariff. Golius] *Jacobus Golius* (1596—1667), who was born at the Hague, came of an ancient and renowned family. He studied at the University of Leyden till his twentieth year, when he went to live in the country. After some time he left for France, living for a while at La Rochelle; but he returned to the Netherlands on account of the Religious Wars. *Golius* was an eminent man of learning, with great knowledge of various branches of science, having applied himself to the study of the classical languages, philosophy, theology, medicine and mathematics; besides he was a good Arabian and Persian scholar, having learned those two languages during a long stay in Morocco and in the Levant, where he likewise obtained many very valuable manuscripts. In 1629 he became Professor of Mathematics in Leyden. *Golius* was the author of several works of great importance, the best known of which are possibly his Arabian-Latin and his Persian-Latin Dictionaries (*Biogr. Woordenboek der Nederlanden*, vol. VII p. 270 and *Biographie Universelle*, vol. XVII p. 117.).

P. 58. l. 8 from top.

Anno 1661] *Epist. Medicin. Cent. III.* has erroneously 1666.

IV

RESPONSIO AD VINDICIAS HEPATIS REDIVIVI.

This Treatise, dated November 28. 18, 1661, appeared in the following year as the second of the four treatises in *Nicolaï Stenonis Observationes Anatomicae* . . . Lugd. Batav. 1662. It is a reply to *Deusing's Vindiciae Hepatis Redivivi*, directed against *van Horne*, whom *Deusing* took to be the real author of *Steno's Disputatio Anatomica De Glandulis Oris* . . . Lugd. Batav. 1661. See the Introduction and the two previous Treatises (II and III, vol. I p. 17 and p. 55 of the present Edition). — The Editor has not been able to find any copy of *Deusing's Vindiciae Hepatis Redivivi*.

P. 62. l. 18 from bottom.

furtivis coloribus [plendere] *Horatius, Epistolae* I 3, 19—20:

— — — moveat cornicula risum
furtivis nudata coloribus.

Edd. Lugd. Batav. 1662 and 1680 have both *furtivus* for *furtivis*.

P. 62. l. 14—15 from bottom.

Christiani Rudnicii] *Christian Rudnick* from *Bütow* in *Further Pomerania* is mentioned in *Haller, Bibliotheca Anatomica* vol. I p. 604, where he is called *Practicus Gedanensis* (i. e. from *Dantzic*), and is put down as the author of a treatise *Cœcum intestinum vulpis & leporis*, printed in *Acta Acad. Nat. Curios.*

P. 63. l. 11—12 from top.

Bilfianam . . . opinionem] See *In*

roduction and the two previous Treatises (II and III of the present Edition) *passim*.

P. 63. l. 18 from top.

nec ulla] Ed. Lugd. Batav. 1680 has *nulla*.

P. 63. l. 13 from bottom.

possis] Ed. Lugd. Batav. 1680 has *possit*.

P. 64. l. 6 from top.

Experiment. I.] Ed. Lugd. Batav. 1662 has *expiment. I.* — The experiment spoken of in *Ioannis Pecqueti . . . Experimenta Nova Anatomica . . . Parisiis 1651*, p. 50 is as follows: A collapsed, tied-up bladder, being under great pressure, will expand and swell, as soon as the pressure is diminished. The experiment is referred to here only as an example of something surprising, something not to be expected beforehand.

P. 64. l. 8 from top.

Præception.] *Hippocrates, Præceptiones (Παράγγελμα)* 1–2. Ed. Littré. vol. IX p. 252.

P. 64. l. 11–12 from top.

Bilfi . . . experimento] See *Steno's Disputatio Anatomica De Glandulis Oris . . . passim*, especially thesis 42 (vol. I p. 42 in the present Edition); furthermore, *Ole Borch's Letter to Th. Bartholin in Epist. Medicin. Cent. III. Hafniae 1667. Epist. LXXXV p. 364* and *Bils' Epistolica Dissertatio* (see note to vol. I p. 32. l. 8 from top).

P. 64. l. 18 from top.

observavi præscriptam a *Bilfio* methodum] See note to vol. I p. 32.

l. 8 from top and p. 57. l. 7–8 from top.

P. 65. l. 9–10 from top.

Barthol. . . aggressus est?] See *Ludovici De Bils . . . ad Th. Bartholinum Regium Hafniae Professore Epistola* (dated Rotterdam April 10, 1661). This pamphlet forms pp. 33–39 of *Ludovici De Bils . . . Responsio Ad Admonitiones Dⁱ Johannis ab Horne . . . Roterodami 1661*.

P. 67. l. 1 from top.

dicere] See *Th. Bartholini Spicilegium Secundum Ex Vasis Lymphaticis . . . Hafniae 1660*, p. 40.

P. 67. l. 16 from top.

occasionem Exsequiarum Hepatis] See note to vol. I p. 55. l. 3 from bottom.

P. 68. l. 3–4 from top.

humorem præparare] See *Nicolai Stenonis Disputatio Anatomica De Glandulis Oris . . . Secunda. Lugd. Batav. 1661. thes. 22. (vol. I p. 31 in the present Edition)*.

P. 68. l. 6 from bottom.

Zaffii sensum] *Zassius*, a physician of Rotterdam, repeatedly came forward as the defender of *Bils*; see, for instance, *Epistola Apologetica Ad Magnum Th. Bartholinum . . . Roterodami 1661*, in which pp. 3–11 were written by *Zassius* (see note to vol. I p. 32. l. 8 from top).

P. 69. l. 5 from top.

ita loquitur] *De Bils . . . Epistolica Dissertatio . . . p. 22. See note to vol. I p. 32. l. 8 from top.*

P. 69. l. 7 from top.

ubique influit] *Bils* has *ibique*.

P. 69. l. 11 from bottom.

Clariff. *Schneid.* tom. 3] *Contradi Victoris Schneideri . . . Liber De Catarrhis Tertius . . . Wittebergæ* 1661. P. 554 *Schneider* enumerates all the places, in which he has found *pituïta* to be secreted: 1) *Membrana pituitaria anterior, quæ interiora narium & interstitium earum diversimodè involvit*, 2) *Membrana pituitaria posterior*, 3) *Tonillæ*, 4) *Ductus Salivales, & illi Sublinguales*, 5) *Lingua, ejusq; vasa*, 6) *Larynx & Epiglottis*. 7) *Summa Gula & Gurgulio*.

P. 70. l. 11—12 from top.

de Tabaci Fumo] *Tabacologia: Hoc est, Tabaci, Seu Nicotianæ descriptio Medico-Chirurgico-Pharmaceutica . . . Per Iohannem Neandrum . . . Lvgdvni Batavorum* 1622. This book contains (pp. 228—240) a letter written by *Adrianus Falcoburgius (van Valckenburg)* (1581—1650), Professor of Leyden and an able teacher, especially interested in pathological anatomy (*Biogr. Woordenboek der Nederlanden*, vol. VI p.36).

P. 70. l. 9—10 from bottom.

loqvitur] *Edd. Lugd. Batav.* 1662 and 1680 have here *loqui eum* instead of *loqvitur*.

P. 71. l. 5—6 from top.

de Experimentis Anatomicis Bilfianis] *Th. Bartholini Responsio De Experimentis Anatomicis Bilfianis Et Difficili Hepatis resurrectione, Ad Clarissimum Virum Nicolaum Zas. Hafniæ* 1661.

P. 71. l. 9 from top.

Spicileg. 2.] *Th. Bartholini Spicile-*

gium Secundum Ex Vasis Lymphaticis . . . Hafniæ 1660. c. VII p. 33. Here and in the remainder of the treatise *Steno* quotes from the reprint of the following year: *Thomæ Bartholini Spicilegia Bina Ex Vasis Lymphaticis . . . Amstelædami* 1661.

P. 71. l. 11 from top.

in fine tractatus] *ibid.* p. 47 in *Ed. Hafniæ* 1660, and pp. 116—117 in *Ed. Amstel.* 1661.

P. 71. l. 14 from top.

repugnarim] Both editions of *Spicilegium Secundum* (*Hafniæ* 1660 and *Amstelædami* 1661) have *repugnarim*, but *Steno* has *repugnarem*.

P. 71. l. 18 from top.

In *Responf.* autem p. 10] *Th. Bartholini Responsio De Experimentis Anatomicis Bilfianis . . . Hafniæ* 1661. *Steno* quotes from an edition, published the same year in Amsterdam; and p. 10 corresponds to p. 15 of *Ed. Hafniæ* 1661.

P. 71. l. 9 from bottom.

omnibus notum] *Gasparo Aselli* found *vasa lactea* in 1622. His discovery was published in the year after his death: *De lactibus s. lacteis venis quarto vasorum mesaraicorum genere, novo invento dissertatio . . . Mediolan.* 1627. (quoted from *Haller, Bibliotheca Anatomica*, vol. I p. 362). The tract on *Aselli's* discovery exists in several editions, and is also reprinted in *Le Clerc & Mangetus, Bibliotheca Anatomica, Genevæ* 1685 and 1699.

P. 72. l. 2 from top.

in *Epistolica Differtatione*] See note to vol. I p. 69. l. 5 from top.

P. 72. l. 4 from top.

[*se vias*] *Bilfius* has *vias se*.

P. 72. l. 19 from top.

c. 8. *Vas. Lymphat.*] *Thomæ Bartholini Vasa Lymphatica, Nuper Hafniæ in Animantibus inventa, Et Hepatis exsequiæ*. Hafniæ 1653. c. 8. p. 55–56. *Steno* has, erroneously, c. 7.

P. 72. l. 14 from bottom.

[*in animalibus*] *Bartholin* has *in animalibus*.

P. 72. l. 11–12 from bottom.

Vidimus . . . esse sui generis] The word *illa* is not found in *Steno*. *Bartholin* has *sui esse* instead of *esse sui*.

P. 72. l. 10–11 from bottom.

Lymphatica nobis dicta] The designation *vasa lymphatica* is due to *Bartholin* (*Vasa Lymphatica, Nuper Hafniæ in Animantibus inventa . . . Hafniæ 1653*). See, also, note to vol. 1 p. 21. l. 1 from top.

P. 73. l. 8 from top.

Spicileg. p. 104] See note to vol. 1 p. 71. l. 9 from top. Page 104. of Ed. *Amstelædami 1661* corresponds to p. 37. of Ed. *Hafniæ 1660*.

V

DE GLANDULIS OCULORUM NOVISQVE EARUNDEM VASIS OBSERVATIONES ANATOMICÆ.

This Treatise, which is dated Leyden December 6, 1661, appeared in the following year, as the third of the four treatises in *Nicolai Stenonis Observationes Anatomicæ . . . Lugd. Batav. 1662*.

See, moreover, Treatise 111 of the present Edition.

P. 77. l. 2 from top.

D. SIMONI PAULLI] *Simon Paulli* (1603–1680), who was born at Rostock in Mecklenburg, came to Denmark when only one year of age, his father being appointed Physician in Ordinary to the Queen Dowager Sophie. After having studied at Rostock and Leyden, as well as in Belgium and England *Paulli* returned to Denmark in 1626, where he worked at botany and mathematics, the latter under *Thomas Fincke* of Copenhagen. Then he went abroad for a second time, among other places visiting Paris, where he obtained favour with *Riolan*. In 1630 he was made a Doctor at Wittenberg, and two years later he became Professor of Medicine at Rostock. In 1639 he was called to Denmark, where he was appointed Professor *Extraordinarius* of Anatomy, Surgery and Botany at the University of Copenhagen. In 1645 he inaugurated the first Danish *Theatrum Anatomicum*, being the first Professor of Anatomy in his adopted country. However, he was not much interested in this branch of science, and in 1648 he resigned his professorship to *Thomas Bartholin*, in order to devote himself to the study of botany which he cultivated in several ways, for instance by making botanical excursions with his students. In 1650 *Paulli* became Physician to the Royal Household; in 1656 he was appointed Physician in Ordinary to the King; besides he obtained a Canonicate and later on a Prelature in Aarhus in Jutland (Denmark). His most important contribution to literature is his work *Flora Danica* (1648). See *Dansk biografisk Lexikon*,

vol. XII p. 567. (*Jul. Petersen, E. Rosstrup*).

P. 77. l. 5 from top.

D. GEORGIO HILARIO] *Jørgen Eilertsen, Georgius Hilarius* (1616–1686) was born at Vordingborg in Denmark and from 1635 to 1638 studied at the University of Copenhagen, where he graduated in theology. After that he went abroad for some time, returned and lived as a vicar in the country till 1641, when he was appointed assistant master at Vor Frue Skole (Our Lady's School) in Copenhagen, graduating in the same year as Master of Arts. In 1654 he was appointed Titular Professor at the University, and in 1672 he became Professor Ordinarius of Mathematics. He had been Steno's teacher, when the latter went to school at Our Lady's. See *Dansk biografisk Lexikon*, vol. IV p. 464 (*S. M. Gjellerup*).

P. 79. l. 10 from top.

Stevinus] *Simon Stevin* (1548–1620) an eminent mathematician and mechanician, who contributed largely to the foundation of the science of statics. (*Biogr. Woordenboek der Nederlanden*, vol. XVII 2. p. 1003 and *Biographie Universelle*, vol. LI p. 237.) In *Les Œuvres Mathématiques De Simon Stevin de Bruges* . . . Par Albert Girard. A Leyde 1634. *I Livre de la Geographie*. p. 110 Stevinus, in continuance of and relative to a long Letter written by *Hugo Grotius*, discourses on the praise of previous scientific contributions, contained in the works of certain classical authors.

P. 79. l. 23 from top.

Crispini famam] See *Horatius, Sermones*, I 1, 120.

*ne me Crispini scriinia lippī
compilasse putes.*

Porphyrius says in his commentary: *Plotius Crispinus philosophiæ studiosus fuit. Idem et carmina scripsit, sed tam garrula, ut aretalogus diceretur.*

P. 79. l. 24 from top.

hunc factum] Ed. Lugd. Batav. 1662 has *hunc factum*.

P. 82. l. 11–12 from top.

Whartono innominata dicta] See *Adenographia* . . . *Authore Thomâ Whartono*. Londini 1656. c. XXVI pp. 176–187. *Wharton*, as was common in those days, described a *glandula lacrymalis* and a *glandula innominata*. The former is situated in the inner canthus of the orbit and in many mammals is actually a lachrymal gland, corresponding to the *caruncula lacrymalis* in man. The latter, *glandula innominata*, is situated in the lateral part of the orbit and is the one now called the lachrymal gland. — *Wharton*, having discussed the various theories concerning the secretion of tears (p. 178) gives his own view (pp. 181–182). P. 182: *Certum est, cerebrum in mœrore contrahi; & contractum, aliquid exprimere; cùmque materia tenuior, factâ compressione, faciliùs exiliat quàm crassior; fit, ut ea sic expressa valde tenuis sit, apteq; lachrymarum formam suscipiat*. According to *Wharton*, the tears pass along the nerves into the eye, out of which they pass through minute pores. He does not believe tears to be secreted from his *glandula lacrymalis* (*caruncula lacrymalis*), but still he adds (p. 182): *non tamen planè nego, quin aliquæ cerebri humiditates per hanc partem evacuentur*. About the function of his *glandula innominata* (*glandula lacry-*

malis) he says (p. 183): *Ufus hujus glandulae propemodum coincidit cum priore . . . et haec quoque humiditates quasdam, quamquam non totam lachrymarum materiam, oculo suppeditat.* While Steno maintains that *glandula innominata* secretes the tears, he does not object to *glandula lacrymalis* being a gland, and perhaps he tacitly takes it for granted that its function is, also, that of secreting lachrymal fluid. Observe that the examinations of Wharton and Steno were made on animals, not on man. Besides, Steno was the first to prove that the upper and lower lachrymal ducts are the channels, along which the tears are conveyed to the cavity of the nose.

P. 82. l. 12—13 from top.

conglomeratarum . . . munus] On Sylvius's classification of the glands, see note to vol. I p. 20. l. 17—18 from bottom.

P. 82. l. 11 from bottom.

Platerus meminit] See *Felices Plateri . . . Praxeos Seu de cognoscendis, praedicendis, praecauendis, curandisq; affectibus homini incommodantibus Tractatus I—III.* Basileae 1608—1609, vol. III sect. 2. c. VII p. 734.

P. 85. l. 18—19 from top.

Platerus statuit] *Ibid.* p. 737 and following pages.

P. 85. l. 14 from bottom.

Veslingius putat] See *Ioannis Veslingii . . . Synagma Anatomicum, Locis plurimis auctum, emendatum, nouisque iconibus diligenter exornatum.* Patavii 1647, c. XV p. 198: *Vnde igitur liquor ille, iniquis, in dolore tam fecundus, tam paratus? Non ab ipsis sane oculis,*

sed à cerebro, per secundum cuneiformis ossis foramen, tum à vertice capitis ac lateribus ad punctorum propositorum ductus confluit. This passage is not found in Ed. Francofurti 1641 nor, as is most likely, in the original edition (Patavium 1641). — *Secundum cuneiformis ossis foramen is the fissura sphenoidalis ossis sphenoides.* — See *Syntagm. Anat. Tabulae Cap. XIII Declaratio.* p. 167 and fig. V on p. 169.

P. 85. l. 11 from bottom.

Clariff. Schneiderus] A very elaborate account of the various theories concerning the process of secretion of tears is to be found in *Conradi Victoris Schneideri . . . Liber De Catarrhis Tertius . . . Wittebergae* 1661. See p. 329. Schneider's own view is spoken of on p. 501 and the following pages. See note to vol. I p. 28. l. 4 from top.

P. 85. l. 10—11 from bottom.

Ingeniofissimus Cartesius] See *Les Passions De L'Ame. Par René Des Cartes.* A Paris 1649. Article CXXVIII p. 169: *Et pour bien entendre leur origine, il faut remarquer que bien qu'il forte continuellement quantité de vapeurs de toutes les parties de nostre corps, il n'y en a toutefois aucune dont il en forte tant que des yeux, à cause de la grandeur des nerfs optiques, & de la multitude des petites artères par où elles y vien[n]ent; Et que comme la sueur n'est composée que des vapeurs, qui sortant des autres parties se convertissent en eau sur leur superficie, ainsi les larmes se font des vapeurs qui sortent des yeux.*

P. 86. l. 3 from top.

Wharton. Adenogr. c. 26] pp. 178—179.

P. 89. l. 8 from top.

oculos erudiere] *Ovidius, Remedia Amoris*, 689—690:

*Nave puellarum lacrymis moveare caveto;
Ut fletent, oculos erudiere suos.*

P. 89. l. 16 from bottom.

juxta illud Ovidii] *Ars amandi* I 661—662.

P. 90. l. 12 from top.

Clariff. Bartholinus] See *Thomæ Bartholini Historiarum Anatomicarum Rariorum Centuria I et II*. Hafniæ 1654. Cent. II Hist. XCVII p. 345.

P. 90. l. 1—2 from bottom.

glandulæ . . . sudorem producant] See Letter from Steno to Th. Bartholin in *Epist. Medicin. Cent. III*. Hafniæ 1667. Epist. LXV p. 263. It is found as No. VII in the present Edition, vol. I p. 101.

VI

DE NARIUM VASIS.

This Treatise must have been composed in December 1661, being written as an appendix to the preceding one, *De Glandulis Oculorum*, which bears the date of December 6, 1661, and together with which it appeared in print about New-Year 1662, as the last of the four Treatises in *Nicolai Stenonis Observationes Anatomicæ* . . . Lugd. Batav. 1662.

P. 93 l. 6—7 from bottom.

Libr. de Carn.] Hippocrates, De Carnibus (Περὶ ἀρχῶν ἢ σάρκων) 16. Ed. Littré. vol. VIII p. 604.

P. 94. l. 12—13 from top.

aqvæ ductum] *Aqvæ ductus* is now called *Tuba Eustachii*.

P. 94. l. 13—14 from top.

tunicæ Schneideropituitariæ appellatæ] See note to vol. I p. 28. l. 4 from top and p. 69. l. 11 from bottom.

P. 94. l. 13 from bottom.

Veslingius existimat] See *Ioannis Veslingii . . . Syntagma Anatomicum* . . . Patavii 1647. c. XV p. 197: *Recumbit in eo [sc. cantho interno] Caruncula spongiosa, & mollis, meatum subiecti ossis, qui ad nares pertingit, operiens, ut fluxum per eas lacrymarum impediatur; unde lacrymalis dicta est.* The last four words are not found in Ed. Francofurti 1641.

P. 94. l. 9—10 from bottom.

hujusmodi] *Schneider* has *ejusmodi* instead of *hujusmodi* and in the next line *ea foramina* instead of *hæc foramina*.

P. 94. l. 2 from bottom.

de ocul. part. 1. c. 13] See *Hieronymi Fabricii Ab Aqvapendente De Visione Voce Auditu*. Venetiis 1600. Pars I c. 13. p. 25.

P. 95. l. 2—3 from top.

in utroque angulo] Ed. Venet. has *vnoquoq;* instead of *utroque*.

P. 95. l. 11—12 from top.

nervosum] *Nervosus* was still at that time used in a sense closely corresponding to what was afterwards called *fibræ*.

P. 95. l. 10 from bottom.

non raro notavi] The following

description applies to the conglomerate nasal gland, *glandula nasalis Stenonis*, about which Steno expressly states that it is not found in man.

P. 96. l. 18—19 from bottom.

in utraque parte una] The following description refers to *ductus incisivi s. nasopalatini*, also called the *canales Stenonis* after the name of their discoverer. These ducts are the remainder of the wide aperture between the mouth and the nasal cavity which exists in early fetal life, an aperture which in man closes before birth, whereas it remains in many animals. The Organ of Jacobson, discovered by a countryman of Steno, opens into these ducts.

P. 96. l. 9 from bottom.

tertium maxillae offis supercilium] *Os tertium maxillae* is what is now called *processus nasalis maxillae superioris*.

P. 97. l. 6—7 from bottom.

Κρατεῖν . . . τοὺς πόρους] Steno possibly has in mind the following passage in Hippocrates, *De Epidemiis* (Περὶ Ἐνδημιῶν) VI 5, Πόρος, τοῖαν ἀπορροῖαν καὶ παρὰ σίτος, ὕψος ἀπὸ γυναικῶν. See Ed. Littré, vol. V p. 316 and note on p. 317.

VII

SUDORUM ORIGO EX GLANDULIS. DE INSERTIONE & VALVULA LACTEI THORACICI & LYMPHATICORUM.

This Letter from Steno to Th. Bartholin, dated January 9, 1662 (new style), accompanied the copy of the then just published *Observationes Anatomicæ* . . . Lugd. Batav. 1662, sent by

Steno to Bartholin. The Letter is found in Th. Bartholini *Epist. Medicin. Cent. III. Hafniæ* 1667. pp. 262—266, numbered *Epist. LXV*.

P. 101. l. 5 from top.

a *Disputatione*] Steno's *Disputatio Anatomica De Glandulis Oris* . . . Lugd. Batav. 1661, appeared early in July. It was reprinted as the first of the four Treatises in *Observationes Anatomicæ*, published immediately after New-Year 1662. It is found as II in the present Edition, vol. I. p. 9.

P. 101. l. 8 from top.

excurfione avocatus] See vol. I p. 55.

P. 101. l. II from bottom.

Sylvius conglomeratas nominat] See note to vol. I. p. 20. l. 17—18 from bottom.

P. 102. l. 19—20 from top.

a Clariff. Borrichio tibi illa significari] The letter from Ole Borch to Th. Bartholin to which Steno refers in this place, bears the same date as Steno's, viz. January 9, 1662. It is found in Th. Bartholini *Epist. Medicin. Cent. III. Hafniæ* 1667. pp. 416—425, numbered *Epist. XCVII*.

P. 102. l. 17 from bottom.

fui occupatus] See vol. I p. 57. l. 18 from top.

P. 102. l. 1—2 from bottom.

D. Blasium . . . fraterque ejus] See the Introduction and the previous Treatises *passim*. Concerning Blaes' brother see notes to vol. I p. 4. l. 15 from top and p. 19. l. 15 from bottom.

P. 103. l. 7—8 from top.

Magnifico Domino Cancellario] The Danish nobleman Peder Reedtz (1614—1674) was appointed Chancellor of Denmark in 1660. The following year he became Patron of the University of Copenhagen (see *Dansk biografisk Lexikon*, vol. XIII p. 564). — Bartholin endeavoured to pave the way for the appointment of Steno to a professorship at the University. However, he later on gave up this for the benefit of Matthias Jacobæus. See note on p. 226.

VIII

CUR NICOTIANÆ PULVIS OCULOS CLARIORES REDDAT. DE LACTEA GELATINA OBSERVATIO.

This Letter from Steno to Th. Bartholin is dated Leyden May 21, 1662. It is found in *Thomæ Bartholini Epist. Medicin. Cent. IV. Hafniæ 1667*. pp. 1—10, numbered *Epist. I*.

Bartholin's reply of February 14, 1662 (*Epist. Medicin. Cent. III. Hafniæ 1667. Epist. LXVI*) to Steno's Letter of January 9 (*ibid.* p. 262. Vol. I p. 99 in the present Edition) contains, on p. 267, the following request, which occasioned the appearance of this Letter. *Tu videris, an ex ductus tui¹⁾ cum oculis commercio copiosus humor ex oculis per nares educatur pulvere nicotianæ. Testabatur mihi olim illustri Wormius Consulem Christiano Hafniensem²⁾ imbecilli visu laborantem ope talis pulveris optime re-*

¹⁾ i. e. *canalis naso-lacrymalis*.

²⁾ In 1618 Christian IV had founded the town of Christianshavn on the north-west point of the isle of Amager, opposite to Copenhagen. In 1674 it was incorporated with Copenhagen.

stitutum. Idem in ipso me expertus sum. Acutius enim multò video objecta remotiora post usum pulveris tabaci.

P. 107. l. 10—11 from top.

placuisse tibi . . . ostendisti] Concerning this, see Bartholin's Letters to Steno of February 14, 1662, in *Epist. Medicin. Cent. III. Hafniæ 1667. Epist. LXVI* p. 266—267, and to Ole Borch, of the same date, *ibidem. Epist. XCVIII* p. 426. See note to vol. I p. 103. l. 7—8 from top in the present Edition.

P. 108. l. 9 from top.

Quod D. Blasium spectat] See note to vol. I p. 102. l. 1—2 from bottom.

P. 108. l. 16 from bottom.

Nec Deusingii opprobria moror] See the Introduction and the Treatises II, III and especially IV in the present Edition.

P. 108. l. 14 from bottom.

Bilfii fautorem] See the Introduction, the note to vol. I p. 6. l. 11 from bottom, and previous Treatises *passim*.

P. 109. l. 18 from top.

in Lili Gyraldi Dialogis] Lilio Gregorio Giraldi (1479—1552), born in Ferrara, a Protonotary Apostolic, was a good poet and an expert archæologist. The first complete edition of his works appeared in Basle, 1580; but in this the editor has not been able to find the treatise referred to by Steno; on the other hand, see *Lili Gregori Gyraldi . . . Opera Omnia . . . Lvgdvni Batavorvm 1696*. vol. II *Dialogismus VII. Ad Vincentium Madium Philosophum de fascino & fascinatione*. p. 873: *Fascinatio autem*

morbus est, qui ex spiritu fascinantis per oculos fascinati ad cor ipsius ingresso pervenit: spiritus enim cordis à calore ex puriori sanguine generatur. Tales autem sunt in nobis spiritus, qualis est sanguinis humor. Spiritus autem similes sibi radios per oculos quasi per vitreas fenestras emittit. Cor enim suo perpetuo quodam motu proximum sibi sanguinem agitans ex eo spiritu, in totum corpus, perque illos luminum scintillas per membra diffundit quidem singula, per oculos autem maxime. Ad altissimas partes, cum sit levissimus, maxime evolat spiritus, ejusque lumen per oculos cum perspicui maxime & nitidi sint, maxime emicat. Nam quod aliquod lumen in oculis sit, patet ex eo, quod quorundam brutorum oculi in tenebris micant.

P. 109. l. 18—19 from bottom.

Cartesius . . . in suo *De Homine Tractatu*] In the work in question Descartes has nothing to that effect about the tears. Steno no doubt had in mind what he says in *Les Passions De L'Âme*, Article CXXVIII. See note to vol. I p. 85. l. 10 from bottom.

P. 109. l. 10—11 from bottom.

detectis novis lacrymarum . . . rivulis] See the Treatise V in the present Edition, especially vol. I p. 85. l. 10 from bottom.

P. 110. l. 14 from bottom.

in *Peireskii Vita Gassendus*] See *Viri Illustres Nicolai Clavdii Fabricii De Peiresc . . . Vita, Per Petrum Gassendum . . . Parisiis 1641. lib. V p. 280: Animaduertit si quidem oculos suos sic excipere imagines rerum, ut afferuarent illas diutius, & maxime quidem cum à somno humescerent. Sic*

expertus est illies, cum respexisset in fenestram clathris igneis, quadratulisque papyraceis interstinctam, circumferre sese deinceps illius formam in oculis; sed cum eo discrimine, ut si clausos quidem contineret, tum clathros obscuros, & quadratula candida, cuiusmodi conspecta fuerant, videre adhuc videretur.

P. 110. l. 10—11 from bottom.

cum Nobil. *Gerstorphiis* meis] Ole Borch was for five years the tutor of the sons of Joachim Gersdorf, the Lord High Steward of Denmark. When in 1660 he was appointed professor at the University of Copenhagen and went abroad, this connection ceased. In 1661, however, Joachim Gersdorf died, and his sons were sent abroad to be once more in the care of Borch. Steno made their acquaintance in Holland. See *Dansk biografisk Lexikon*, vol. II p. 501.

P. 111. l. 6 from bottom.

cum *Rolandi Sturmii . . . tractatu*] *Febrifugi Peruviani Vindiciarum Pars Prior (et Altera) . . . Auctore Rolando Sturmio. Delphis 1659.* — In this book the author strongly advocates Peruvian bark as a remedy against fevers. The poem in honour of the author, placed at the beginning of the book, cannot be said to exaggerate when it opens with the following eulogy:

*Iam fugiunt Rolande febres, jam pallida cedit
Mors tibi, jam vitam fama designa refert.
Quem laudas veteri cortex ex arbore vite
Hic superest —*

IX

OBSERVATIONES ANATOMICÆ IN AVIBUS & CUNICULIS.

This Letter from Steno to Th. Bar-

tholin is dated Leyden August 26, 1662. It is found in *Thomæ Bartholini Epist. Medicin. Cent. IV.* Hafniz 1667. pp. 103-113, numbered *Epist. XXVI.*

P. 115. l. 10 from bottom.

De Clarissimo Blasio] On Steno's controversy with Blaes concerning the priority of the discovery of the duct of the parotid gland, see the Introduction, the previous Treatises *passim* as well as the notes belonging to the latter, and *Apologiæ Prodomus* (XIII, vol. I p. 143 in the present Edition). The following part of the Treatise refers to a statement of Bartholin's in a letter to Steno, dated Copenhagen February 14, 1662, which is found in *Epist. Medicin. Cent. III.* Hafniz 1667. *Epist. LXVI* pp. 267-268: *D. Blasius suspectum me habet, nullo meo merito, iccirco nuper me purgavi, quia nollem inter vos similitates, speremq; me inter vos reducturum tandem amicitiam.*

P. 116. l. 1 from top.

van Horne aggressus sit] As to this, see the Introduction, but especially Steno's *Responsio ad Vindicias Hepatis Redivivi* (IV vol. I p. 59 in the present Edition); see, moreover, most of the previous Treatises *passim*.

P. 116. l. 6 from top.

apud Lucianum Timon] See *Lucianus*, Τιμων 2.

P. 116. l. 12 from top.

accessit etiam Antonius Everhardi] See Steno's *Disputatio Anatomica De Glandulis Oris* . . . *Secunda*. Lugd. Batav. 1661 (II vol. I theses 49-52, pp. 46-49 in the present Edition). To this Everaerts replied in his *Lux è*

Tenebris Affulsa, Ex Viscerum Monstrofi Partus Enucleatione Propositaq. Ab Anthonio Everardi . . . *Medioburgi* 1662.

P. 116. l. 14 from bottom.

quod Hollandicis denegavit] Middelburg is in the province of Zeeland, Leyden in the province of Holland.

P. 117. l. 2 from top.

nulla ratione possem evitare] Th. Bartholin was the discoverer of the lymphatic vessels. See note to vol. I p. 3. l. 1 from top.

P. 117. l. 7-8 from top.

in corvo aquatico] i. e. *Phalacrocorax carbo* (L.).

P. 117. l. 11-12 from bottom.

Parens . . . in *Anatomicis Institutionibus*] *Casp. Bartholini* . . . *Institutiones Anatomicæ* . . . ab Auctoris Filio Thoma Bartholino. Lvg. Batavorum 1641, lib. I c. XV p. 90 has about *ductus communis*: & oblique inferitur inter utramque intestini tunicam, [digiti longitudine] & quidem aliquando bifidus . . . The edition of 1641 is the first edition, which was revised by Th. Bartholin. The editor of the present work has not seen the original edition (Wittenberg 1611). In the oldest reprint from it, that of Rostock 1622, the two words within brackets are not found.

P. 118. l. 10 from top.

ex Harvæi sententia] See *Exercitationes De Generatione Animalium* . . . Autore Gvilielmo Harveo . . . Londini 1651. *Exercit. 6.* p. 21: *infra jecur ventriculus positus est; cui subjacent intestinorum volumina, cum plurimis tenuibus membranis interjectis, aëre repletis;*

quippe in has, ut diximus, asperæ pul-
monum arteriæ foraminibus huiusmodi ape-
riuntur.

P. 118. l. 17 from top.

cum Celeberrimo Pisone] Willem
Piso (1611–1678), who was born in
Leyden, took his doctor's degree in Caen
in 1630, and in 1637 he became Physi-
cian in Ordinary to Count Joan Mau-
rits of Nassau. He took part in a long
journey to Brazil, and, from 1648 until
his death, he lived as a physician in Am-
sterdam. Among other works he is the
author of *De Medicina Brasiliensi Libri*
Quatuor . . . Lugdun. Batavorum et Am-
stelodami 1648 and *De Indiæ Utriusque*
Re Naturali Et Medica Libri Quatuor-
decim . . . Amstelædami 1658. See *Biogr.*
Woordenboek der Nederlanden, vol. XV
p. 332 and *Biographisches Lexikon der*
hervorrag. Aerzte von E. Gurlt, vol. IV
p. 577.

P. 118. l. 18 from top.

Dn. Gottwald] Cristoph Gottwaldt
(1636–1700) was a learned physician
and scientist from Dantzic (*Gedanum*).
He was made a doctor in Leyden 1662.
See *Biographisches Lexikon der her-*
vorrag. Aerzte von E. Gurlt, vol. II
p. 609.

P. 120. l. 13 from top.

Cartesii Tractatus de Homine]
Renatus Des Cartes De Homine Figuris
Et Latinitate Donatus A Florentio Schuyt,
Inclytæ Urbis Sylvæ Ducis Senatore, &
ibidem Philosophiæ Professore. Lugduni
Batavorum 1662. The French original
appeared two years later. — *Sylvæ Ducis*
is the Dutch s'Hertogenbosch.

X

EX VARIORUM ANIMALIUM
SECTIONIBUS HINC INDE FAC-
TIS EXCERPTÆ OBSERVATIO-
NES CIRCA MOTUM CORDIS
AURICULARUMQUE & VENÆ
CAVÆ.

The observations mentioned in this
Treatise are either identical with those
mentioned in the previous Letter to Th.
Bartholin (IX, vol. I p. 113 in the pre-
sent Edition) or they are closely con-
nected with the latter, being in all pro-
bability made almost at the same time,
i. e. in Leyden in 1662. The text itself
practically only consists of brief notes
on each observation, and Steno has made
no attempt to work them up into a
whole; no doubt they were meant to
form part of an exhaustive study on
animal motion or more especially on
the motion of the heart, which work,
however, he never accomplished. The
very last part of the Treatise, from *Pof-*
fent inde alia (p. 127. l. 9 from top) to
the end, in language as well as in contents,
differs from the other part, and has
certainly been added by Steno at a far
later period, viz. when from 1672 till
1674 he was *Anatomicus Regius* in
Copenhagen and left the Treatise in the
hands of Bartholin to be published by
him in *Acta Medica Et Philosophica*
Hafniensia, where it is found in vol. II,
1675, as No. XXXXVI p. 141.

P. 124. l. 9 from top.

repetitis] *Acta Hafn.* has *repetitus*.

P. 124. l. 11 from top.

& arteriæ ductus] *Acta Hafn.* has
ex arteriæ ductus.

P. 126. l. I from top.

In corvo aqvatico] See note to vol. I p. 117. l. 7—8 from top.

P. 127. l. I from bottom.

Stultitia caruiffe] Horatius, *Epistolæ*, I I, 41—42.

XI

DE VESICULIS IN PULMONE.
ANATOME CUNICULI PRÆ-
GNANTIS. IN PULMONIBUS EX-
PERIMENTA. DE LACTEIS MAM-
MARUM. IN CYGNO OBSERVA-
TIONES &C.

This Letter from Steno to Th. Bartholin, dated Leyden March 5, 1663, is found in *Thomæ Bartholini Epist. Medicin. Cent. IV.* Hafniæ 1667, pp. 348—359, numbered *Epist. LV.*

P. 131. l. 4 from top.

binis . . . beatus litteris] Only one of these letters is known, viz. the one found in *Epist. Medicin. Cent. IV.* p. 113, numbered *Epist. XXVII.* dated Copenhagen September 7, 1662.

P. 131. l. 9 from top.

De . . . *Malpighii* observationibus] The results of *Malpighi's* examinations of the structure of the lung, together with his demonstration of the existence of small *vesiculæ* in the latter, were published for the first time in *De Pulmonibus Epistolæ II ad Borellium*, Bononiæ 1661. In his above-mentioned Letter to Steno, Bartholin had spoken of these observations of *Malpighi's* and called upon him to further examine the question. Bartholin had also written to Ole Borch and van Horne about it, and

in 1663 he reprinted *Malpighi's* Letters in Copenhagen: *Thomæ Bartholini De Pulmonum Substantia & Motu Diatribe. Accedunt Cl. V. Marcelli Malpighij de Pulmonibus Observationes Anatomicæ.* Hafniæ 1663.

P. 132. l. 4—5 from bottom.

Dominus Swammerdamus] *Johannes Swammerdam* (1637—1680), born in Amsterdam, was the son of a chemist of that town, who was intensely interested in curiosities of art and nature. In Amsterdam young Swammerdam began to study medicine, especially anatomy, under *Blaes* and *Tulp*. At this early period he made the acquaintance of Steno, which acquaintance soon ripened into friendship. Afterwards they both studied in Leyden, under *Sylvius* and van Horne, and here the two students made many joint investigations, which co-operation, as mentioned in the Introduction, was later on continued at *Thévenot's* in Paris and Issy. In 1665 Swammerdam was once more in Amsterdam, and in 1666 he was in Leyden, where in the following year he was made a doctor. In spite of splendid offers from abroad Swammerdam preferred to stay in Holland. He went to live in Amsterdam, where he lead a retired life in the house of his father, but religious scruples gradually got the upper hand of his otherwise clear intellect; he gave up his scientific studies, and especially after he had came under the influence of *Antoinette Bourignon* his mind gave way altogether. — Swammerdam made many valuable anatomical and physiological discoveries; but his name is chiefly associated with the study of insects and their biology, a branch of science which he was not only the first to cultivate, but

which he also enriched with numerous excellent observations. The manuscript of his chief work, which was for a long time looked upon as lost, was found many years after his death and was edited in Dutch and Latin by Boerhave: *Johannis Swammerdamii . . . Biblia Naturae; Sive Historia Insectorum . . . Leydae 1737-1738*. See, besides, *Biogr. Woordenboek der Nederlanden*, vol. XVII 2 p. 1095.

The experiment mentioned in the text, is spoken of in *Johannis Swammerdamii . . . Tractatus Physico-Anatomico-Medicus De Respiratione Ufque Pulmonum*. Lugduni Batavorum 1667. c. III p. 19 ff., but it had already been mentioned before by Sylvius in the Additamentum to his dissertation *De Respiratione, Usuque Pulmonum*, which appears as No. VIII in *Disputationum Medicarum Pars Prima . . . Amstelodami* 1663. See § 79 p. 126 and § 86 p. 131.

P. 133. l. 2 from top.

[apud Dn. Padbrugium] *Epist. Medicin. Cent. IV.* has Padburgium. — Rob. Padbrugge, a physician, published *De Apoplexia*. Lugd. Batav. 1663. (See *Jöckers Gelehrten-Lexikon, Fortsetz. v. Rortermund*, vol. V. Bremen 1816. col. 1370). — Swammerdam's *Tractatus . . . De Respiratione Ufque Pulmonum* has sect. II c. II p. 77: *Considerandum itaque Primo. Quod Sanguis in Inspiratione (à Diaphragmate se contrahente, atque abdominalis viscera deorsum, introrsum, ac extrorsum cogente; ut & à Thorace sursum moto, Aëremque simul cum Diaphragmate in corporis circumjectas partes atque Pulmones propellente & impellente) è Venis Corporis tam Superioribus quam Inferioribus diversus ac copiosior solito, in Pectus atque Cor versus moveatur: ut observatum*

ab Amico nostro D. Padbrugge in *Corollaris Thesim Inauguralium* Lugd. Bat. habitatum anno 1662.

P. 133. l. 3-4 from top.

[ab ingeniofissimo Dn. Lahr] *Epist. Medicin. Cent. IV.* has Dn. Laer. — Halpler, *Bibliotheca Anatomica* I p. 717 mentions P. v. der Lahr as the author of *De fermentatione, effervescentiis & inflammatione*. Leid. 1685. See also *Epist. Medicin. Cent. IV. Epist. LXX* pp. 418-419 (XIV vol. I p. 159. l. 11 from bottom in the present Edition).

P. 133. l. 7 from bottom.

[Sane Schenckium nil vidisse] See *Joh. Theod. Schenckii . . . Exercitationes Anatomicae Ad Vsvm Medicvm Accommodatae*. Ienae 1662. — When Steno here speaks of Schenck, and when a little further on he mentions the different ways in which the chyle, by various anatomists, was supposed to be conveyed direct to the mammæ, he does so referring to the following passage in *Th. Bartholin's Letter* of September 7, 1662, *Epist. Medicin. Cent. IV. Epist. XXVII* p. 114: *Lactæas quasdam ad mamillas recta sursum tendere vidit Jo. Theod. Schenckius I. I. Exerc. Anat. 7. Sect. 2. c. 32. Sed talem furculum seu canaliculum lacteum ex thoracico ad musculos thoracis, & exinde ad ipsa ubera furtim serpere observavit Pecquetus Exper. IV. contra Riolanum. De ramulis quibusdam ad uterum quoq; Deufingius in Inst. Anat. monet.*

P. 134. l. 15 from top.

[supra abdominalis musculos eodem] See *Novus Et Genitinus Hominis Brutique Animalis Exortus. Authore Anthonio Everardi. Medioburgi* 1661. p. 133.

P. 134. l. 16—17 from bottom.

in responſione ad *Everhardum*] This reply never appeared. See, besides, the previous Treatises *passim*.

P. 134. l. 13 from bottom.

lymphaticorum tuorum... veritas] Refers to *Bartholin's* discovery of the lymphatic vessels. See notes to vol. 1 p. 3. l. 1 from top, p. 6. l. 16 from bottom and p. 21. l. 1 from top.

P. 134. l. 10—11 from bottom.

hepati jungi dixi] See IX, vol. I p. 117. — *Bartholin* dwelt on the obscurity of this passage in his reply, which is found in *Epist. Medicin. Cent. IV.* as *Epist. XXVII.* See p. 115.

P. 134. l. 4 from bottom.

M. A. Severini observatio] In his Letter to *Steno*, *Epist. Medicin. Cent. IV.* *Epist. XXVII* p. 115, *Bartholin* referred to *Zootomia Democritae: Id est Anatome Generalis totius animantium Opificii*... *Marci Aurelii Severini. Norribergæ 1645. pars IV* p. 340, which has: *Jecur paucis, aut ferè nullo intervallo distans à corde, quod quidem parte posteriore quasi per cisternæ os vasa excipit.*

P. 135. l. 4—5 from top.

tractatulum curabo edendum] *Steno's De Musculis & Glandulis observationum specimen* (XV vol. 1 p. 161 in the present Edition) appeared in Copenhagen in 1664. It contains several remarks referring to the controversies just mentioned; but a proper reply to *Everaerts* and *Deusing* never appeared. *Steno* replied to *Blaes* in *Apo-logiæ Prodomus*... *Lugd. Batav. 1663* (XIII vol. 1 p. 143 in the present

Edition), caused by *Hoboken's Novus Ductus Salivalis Blasianus*... Ultrajecti 1662. — See, moreover, *Steno's* next Letter to *Bartholin*, found in *Epist. Medicin. Cent. IV.* as *Epist. LXX* pp. 414—421. (XIV vol. I p. 155 in the present Edition.)

P. 135. l. 18—19 from top.

numerus semper observavi eundem] See IX vol. I p. 117.

P. 135. l. 9 from bottom.

diaphragmatis... absentiam sup-
plentes] *Harvey* states that birds have no diaphragm. See *Exercitationes De Generatione Animalium*... *Autore Gvilielmo Harveo*... *Londini 1651. Exercit. 6.* p. 21 and note to IX vol. I p. 118. l. 10 from top.

P. 135. l. 2—3 from bottom.

de glandula vero lacrymali dicta] See note to vol. I p. 82. l. 11—12 from top.

P. 136. l. 1 from top.

in ventriculo nobili] *Ventriculus nobilis* is what is now called the Fourth Ventricle.

P. 136. l. 4 from top.

colorem... interius cineritium] *Epist. Medicin. Cent. IV.* has *cineritium* instead of *cineritium*. — The pineal gland, as is mentioned above, in certain animals exhibits this very distribution of colour; in the horse, for instance, the cells contain yellow and black pigment. As to *Bartholin's* opinion of *Steno's* observation, see his reply to the latter, in *Epist. Medicin. Cent. IV.* *Epist. LVI* p. 360.

P. 136. l. 11—12 from top.

a Nobiliff. *Cartefio excogitata fabrica*] See note to vol. I p. 120. l. 13 from top and *Steno's Discovers Svr L' Anatomie Du Cerveau*, which was delivered in Paris in 1665 (XVIII vol. II p. 1 in the present Edition).

XII

LYMPHATICORUM VARIETAS.

The investigations, on which this Treatise is based, were most likely made by *Steno* in collaboration with *Swammerdam*, some time in the years of 1662 and 1663; one of the drawings is likewise due to *Swammerdam* (see the Treatise). *Steno* had planned an exhaustive work on the lymphatic system, but never realized his plan. The text of this Treatise is, at any rate as far as the latter part is concerned, no doubt composed long after the time when the investigations were made, probably during *Steno's* stay in Copenhagen in 1672—1674. The Treatise appeared in *Thomæ Bartholini Acta Medica Et Philosophica Hafniensia*. vol. II Hafniæ 1675 as No. XCVII pp. 240—241.

XIII

APOLOGIÆ PRODROMUS, QVO DEMONSTRATUR, JUDICEM BLASIANUM & REI ANATOMICÆ IMPERITUM ESSE, & AFFECTUUM SUORUM SERVUM.

This Tract is the last of *Steno's* writings relative to his controversy with *Blaes* about the priority of the discovery of the parotid duct; concerning this controversy see the Introduction and the previous Treatises *passim*. This pam-

phlet was caused by a little book, with the title of *Novus Ductus Salivalis Blasianus, In lucem protractus A M. Nicolao Hoboken, Ultrajectino, Philosophiæ & Medicinæ Doctore ac Practico*, Ultrajecti 1662, which *Nicolaas Hoboken* (1632—1678), a young friend of *Blaes*, published in his defence. In his pamphlet *Hoboken* stood forth as a judge in the quarrel between the two men. The judgment he pronounced was entirely in favour of *Blaes*; a decision at which he arrived all the more easily, as he did not enter into any investigations of his own in the matter in question. *Hoboken's* pamphlet consists of a preface, written by himself; an anagram on *Steno's* name (see below); a letter from *Hoboken* to *Blaes*; a letter from *Blaes* to *Hoboken*; three testimonials from former pupils of *Blaes*; a letter from *Blaes* to *Th. Bartholin*, dated Amsterdam July 16, 1661 (reprinted in *Thomæ Bartholini Epist. Medicin. Cent. III. Hafniæ 1667. Epist. XLIII pp. 158—184*); and last a letter from *Hoboken* to *Blaes*. About *Hoboken*, see *Biogr. Woordenboek der Nederlanden*, vol. VIII 2 p. 841.

P. 145. l. 6—7 from top.

Ductus Salivalis] *Hoboken* has *Ductus illius Salivalis*.

P. 145. l. 12 from bottom.

in ipfa Apologia] The Apology itself never appeared, as a reconciliation between *Steno* and *Blaes* took place before that time.

P. 145. l. 11 from bottom.

me infelici puero comparando] *Hoboken* has (p. 38): *Infelix puer atque impar congressus Achilli*

P. 145. l. 5 from bottom.

Verba in quibus] The following passage is a somewhat condensed quotation from *Hoboken's* last letter to *Blaes*. See *Hoboken's* pamphlet p. 55 ff.

P. 146. l. 3—4 from top.

Anagrammate publice proclamatus] The anagram runs as follows:

*Super inventionem
ductus Salivallis.*

*STENONIS,
Per Anagrammatifinum,
IS NON EST,
SI NON EST,
SINON EST.*

*AN*ne Salivalem, ductusque invenerit usum
BLASIUS; anne prior tale *Stenonis* opus?
Insipice STENONIS nomen, converte; videbis,
Ille quod IS NON EST, qui esse *Stenonis* amat.
Ex re nomen habet. Quod si tum, candide Lector,
Stenonis NON EST iure repeter; age,
BLASIUS, ut fas est, DUCTUM invenisse SA-
Dicator PRIMUS; nec prior ullus eo. [LIVÆ
BLASIUS inventor prebet, non ille *Stenonis*;
Fallax ritè (SINON¹) nomine quippe suo EST.

¹ Proflitor *Trojano*.

P. 146. l. 7 from top.

in Observationibus Anatomicis] *Nicolai Stenonis Observationes Anatomicæ*... Lugd. Batav. 1662. It is the first of the four Treatises in the book in question and had already been published in the previous year under the title of *Disputatio Anatomica De Glandulis Oris*... Prima (& Secunda). Lugd. Batav. 1661 (6—9 July). The parotid duct, however, had been mentioned still earlier by *Steno* in a Letter to *Th. Bartholin*, dated April 22, 1661. See I and II in the present Edition.

P. 146. l. 14 from top.

th. 13.] The original Paper has *th. V*.

P. 146. l. 16 from top.

Præceptores meos] *van Horne* and

Sylvius. See notes to vol. I p. 4. l. 4—5 from top.

P. 146. l. 14 from bottom.

a *fe inventum proclamatus*] See note to vol. I p. 4. l. 12—13 from top.

P. 146. l. 8 from bottom.

Muidæ] *Muiden*, a town in the province of North Holland.

P. 146. l. 1 from bottom.

Qvod si Blasius... in libro] See *Gerardi Blasii*... *Medicina Generalis*. Amstelædami 1661.

P. 147. l. 6 from top.

ufui alii ignobili destinatus] See II vol. I § 17. p. 25 and *Medicina Generalis*, c. XIII p. 24.

P. 147. l. 12 from bottom.

a *Blasio* petierit *Bartholinus*] *Steno*, when he went to Holland, had a letter of introduction from *Th. Bartholin* to his relative, *Blaes*, who received *Steno* in his house. See the Introduction.

P. 147. l. 7 from bottom.

Dn. Backmeister] *Joh. Backmeister*, M. D. and Professor of Medicine at Rostock, son of *Matthæus Backmeister*, edited in Amsterdam, 1663, *Franz Joël's Opera Medica*, in the first edition of which his father had already been engaged. See *Johannis Mølleri Cimbria Literata*. Havniæ 1744. vol. II p. 50.

P. 148. l. 12—13 from top.

dicat Whartonus] See *Adenographia*... *Authore Thomæ Whartono*. Londini 1656. c. XXI p. 128 and c. XX p. 124.

P. 148. l. 14—15 from top.

distinctio Sylviana] See note to vol. 1 p. 20. l. 17—18 from bottom.

P. 149. l. 17 from top.

In disputatione] *Disputatio de Triplici Coctione Prima*, thes. X: . . . quorum [3: ductuum] unus ad maxillæ superioris latus excurrit, alter ad inferioris extremitatem, circa menti interiora, ad latus frænuli lingvæ . . . (quoted from *Blaes'* quotation in his Letter to Th. Bartholin, *Epist. Medicin. Cent. III.* Hafniæ 1667. *Epist. XLIII* p. 171.).

P. 149. l. 16 from bottom.

mentionem facit egressus ad buccas] The Letter mentioned in the note to p. 149. l. 17 from top contains, on p. 177, the following passage: *Nec tamen volumus salivam non nisi per foramina ea quorum unum in quovis ductu datur, amplum satis, papillari excrescentiâ munitum, in oris cavitatem, exire,...*

P. 149. l. 12 from bottom.

nempe 8. Jul.] *Steno's* first and second Dissertations are dated July 6 and 9. The Letter from *Blaes* to *Bartholin* bears the date of July 16, 1661.

P. 149. l. 3 from bottom.

p. 35.] The original Paper has p. 45.

P. 150. l. 8—9 from top.

rem esse facilis indaginis] *Blaes* has *rem facilis esse indaginis*.

P. 151. l. 9 from bottom.

Prudentior . . . *Vespa erat*] See *Phaedrus* ed. L. Müller. Lipsiæ 1877. 111 13.

P. 152. l. 10 from bottom.

conglomeratas parotides] *Steno*

calls the parotid gland *parotis conglomerata*, and a lymphatic gland imbedded in the parotid gland *parotis globata*. See vol. 1 § 10. p. 22.

P. 154. l. 6 from top.

oculis exponeret] The original Paper has *oculis exneret* and *po* has been added with ink in the only copy of the Paper, which the editor of the present Edition has seen (in The Library of the British Museum).

P. 154. l. 6—7 from top.

affectuum suorum] The original Paper has *affectum suorum*.

XIV

NOVA MUSCULORUM & COR- DIS FABRICA.

This Letter from *Steno* to Th. Bartholin is dated Leyden ult. April, 1663. It is found in *Thomæ Bartholini Epist. Medicin. Cent. IV.* Hafniæ 1667. pp. 414—421, numbered *Epist. LXX*.

P. 157. l. 2 from top.

APOLOGIÆ Prodrumum] XIII vol. 1 p. 143 in the present Edition.

P. 157. l. 2 from top.

Nicolao Kragio] *Niels Krag* is chiefly known on account of his controversy with the University of Copenhagen, which controversy was about payment for services rendered during the time of the siege. In 1667 he was made rector at Ours, where he died in 1680. He was closely connected with the family of *Steno's*, and the sister of the latter, *Anna Kitzerow*, stood god-mother to one of his children. See

Kirkehistoriske Samlinger, series III vol. V. Kjøbenhavn 1884-86. p. 315. (Holger F. Rørdam.)

P. 157. l. 5 from top.

exemplaria quædam accepi] *Sylvii . . . Disputationum Medicarum Pars Prima . . . Amstelodami* 1663. This edition contains eight dissertations. The two dissertations of *Sylvius' De Febris* are found as Nos. IX and X in the next edition.

P. 157. l. 10-11 from top.

me . . . absoluturum] *Steno's De Musculis & Glandulis observationum specimen* appeared in 1664, his *Elementorum Myologiæ Specimen* in 1667, followed by *Historia Musculorum Aquilæ* in 1675. See XV vol. I p. 161, XXII vol. II p. 61 and XXXII vol. II p. 257 in the present Edition.

P. 157. l. 7 from bottom.

nervofam] See note to vol. I p. 95 l. 11-12 from top.

P. 158. l. 1 from bottom.

ut *Vesalius* describit] See *Andreae Vesalii . . . de Humani corporis fabrica Libri septem*. Basileæ 1543. lib. VI c. X p. 587.

P. 159. l. 8-9 from top.

in *Anat. tua Reformat.*] *Thomæ Bartholini Casp. F. Anatomia, Ex Casu pari Bartholini Parentis Institutionibus, Omniumque Recentiorum & propriis Observationibus Tertium ad sanguinis Circulationem Reformata Cum Iconibus novis accuratissimis*. Lugd. Batav. 1651.

P. 159. l. 13 from bottom.

a te litteras] See *Epist. Medicin. Cent. IV*. Hafniæ 1667. Epist. LVI pp. 359-363, dated April 7, 1663.

P. 159. l. 9 from bottom.

& *Becker*] Perhaps identical with the *Becker* who in *Haller's Bibliotheca Anatomica* vol. I p. 707 is called *Daniel Christophori Becker*, where he is mentioned as the author of *De Respiratione*. Utrecht 1684. See, besides, the notes to vol. I p. 133. l. 2 and l. 4 from top.

P. 159. l. 7-8 from bottom.

compressiorem vicinarum partium] See *Th. Bartholin's letter Epist. Medicin. Cent. IV*. Epist. LVI p. 359.

P. 160. l. 17-18 from bottom.

D. *Hobokium . . . misisse litteras, miror*] See the introduction to the notes to *Apologiæ Prodromus* (XIII in the present Edition).

P. 160. l. 8 from bottom.

aperire licuit uteros] See *Th. Bartholin's Letter Epist. Medicin. Cent. IV*. Epist. LXI pp. 360-361.

P. 160. l. 7 from bottom.

promissa *Diatribæ*] *Thomæ Bartholini De Pulmonum Substantia & Motu Diatribæ. Accedunt Cl. V. Marcelli Malpighij de Pulmonibus Observationes Anatomicæ*. Hafniæ 1663.

XV

DE MUSCULIS & GLANDULIS OBSERVATIONUM SPECIMEN.

Nicolai Stenonis De Musculis & Glandulis observationum specimen Cum Epistolis duabus Anatomicis, Hafniæ 1664, appeared in the same year in Amsterdam and was reprinted in Leyden in 1683. The investigations, on which the first Treatise is based, were made in Holland

in the immediately preceding years (1661–1663). Compare previous Treatises.

P. 167. l. 6–7 from top.

publicæ luci . . . expofiturum] See *Steno's Letter to Th. Bartholin*, dated Leyden ult. April, 1663 (XIV vol. 1 p. 155 in the present Edition).

P. 168. l. 15–16 from bottom.

ad aliquod tempus revertendi] About the time of the death of *Steno's* stepfather, *Johan Stichman* (November 1663), his mother was taken ill, for which reason he left Holland in the spring of 1664. His mother died shortly after his return to Copenhagen.

P. 169. l. 3 from top.

Adminiftrat. Anatom. l. 7. § 8] *Galenus De Anatomicis Administrationibus Libri Novem*. *Steno* has, erroneously, l. 7. § 9.

P. 169. l. 6 from top.

de thorace l. 1. cap. 8] See *Casp. Hofmanni De Thorace, Ejusque Partibus Commentarius Tripartitus*. *Frankofvrti* 1627. lib. 1 c. 8. p. 13. He adds: *Nervi enim dant motum animale, qualis heic non est.*

P. 169. l. 15–16 from top.

cor musculus pronuntiant] See *Hippocratis, De Corde* (Περὶ Καρδίας) 4. Ed. *Littre*. vol. IX p. 82 . . . ἡ καρδίη μὲν ἐστὶ χάρατ' ἰσχυρόν, οὐ τῷ νεύρῳ, ἀλλὰ πλεγματὶ σαρκώ.

P. 169. l. 19 from bottom.

D. Harvæus] See *Exercitatio Anatomica De Motu Cordis Et Sanguinis In Animalibus*, *Gvilielmi Harvæi* . . . *Frankofvrti* 1628. c. 11 p. 22: *Ex his mihi videbatur manifestum; Motum cordis esse tentionem quandam ex omni parte, & secundum ductum omnium fibrarum, & constrictionem vndique, quoniam erigi, vigorari, minorari, & durescere in omni motu videtur, ipsiusque motum esse, qualem muscutorum, dum contractio fit secundum ductum partium nervosarum, & fibrarum, muscoli enim cum moventur, & in actu sunt vigorantur, tenduntur, ex mollibus duri fiunt, attolluntur, incrassantur, & similiter cor.* See, also, *ibidem* p. 23. l. 13 from bottom: . . . & dum tenduntur fibræ . . .

P. 169. l. 19 from bottom.
D. Sylvius] On *Sylvius'* conception of the function of the heart, see e. g. his dissertation *De Chyli Mutatione in Sanguinem, Circulari Sanguinis Motu, & Cordis, Arteriarumque Pulsu* [1659], which, as *Disputatio III*, constitutes pp. 23–38 of . . . *Sylvii . . . Disputationum Medicarum Pars Prima* . . . *Amstelodami* 1663. For instance § 9. p. 26: *In cordis ventriculo sinistro accenditur iteratò & rarefit Sanguis ab eodem Igne Cordis interno, accipitque tunc ultimam sui ab Ipso perfectionem.* And § 16. p. 29: *Naturalem proinde putamus vocandam Cordis Ventriculorum Dilatationem, à Sanguine rarefcente factam, uti Animalem eorundem Contractionem per musculos absolutam, & Voluntati quodammodo parentem.* And § 33. p. 34: *Contrahi verò à Spiritibus animalibus parenchyma ipsius musculosum animali motu cientibus.*

P. 170. l. 6 from top.

Spigelius] See . . . *Adriani Spigelii . . . De Humani Corporis Fabrica Libri Decem* . . . *Frankofvrti* 1632. lib. IV p. 134: *Initium autem habent [sc. muscoli*

intercostales externi] *primum à transuersis vertebrarum processibus, quibus costas suo capitulo adnecti diximus.* The original edition is from Venice, 1627.

P. 172. l. 9 from bottom.

Arantio imposuerit] See *Iulii Caesaris Arantii . . . De Humano Foetu Liber Tertio editus, ac recognitus. Eiusdem Anatomicarum Observationum Liber . . . Venetiis 1587. Anatomicae Observationes.* c. XXXIV p. 98.

P. 172. l. 6 from bottom.

carnofas ferri fibras] See note to vol. 1 p. 135. l. 9 from bottom.

P. 173. l. 16 from bottom.

hinc] The original edition, Hafniae 1664, has *hic*. Edd. Amstel. 1664 and Lugd. Batav. 1683 have *hinc*.

P. 173. l. 9 from bottom.

per operationes cognoscendam] See *Nicolai Massa . . . Liber Introductorius Anatomiae, siue dissectionis corporis humani, nunc primum ab ipso auctore in lucem editus . . . Venetiis 1536.* c. XXXII p. 67: . . . *ideo rectius dicitur caro musculosa, non distinguibilis, sicuti etiam sunt labiorum musculi, qui per sectionem minime distinguui possunt.*

P. 175. l. 11–12 from bottom.

quam syringæ veterum affimilaveris] See *Francisci Glissonii . . . Anatomia Hepatis . . . Londini 1654.* c. XXI p. 211.

P. 178. l. 9–10 from top.

in gallo Africano] The name of *Gallina Africana* is used by Gesner, *Marcgraf* and others for the guinea-fowl, *Numida meleagris* (L.).

P. 179. l. 5–6 from top.

Plexus nervorum a Falloppio descriptus] *Falloppius* was the first to describe the plexus of the pneumogastric nerve with its many branches to the heart. See *Gabrielis Falloppii . . . Observationes Anatomicae, In quinque libros digestæ . . . Opera & studio M. Iohannis Sigfridi Margsfulenensis . . . Helmstadii 1588.* lib. IV c. XV pp. 184b–186. The original edition appeared in Venice in 1561.

P. 181. l. 16 from top.

Hippocrati . . . qui dicit] See note to vol. 1 p. 169. l. 15–16 from top.

P. 182. l. 8 from top.

ego sumpsi] Edd. Amstel. 1664 and Lugd. Batav. 1683 have *ego sum*.

P. 182. l. 4 from bottom.

Glandularum . . . natura] From here and onwards to the end the *Treatise* is chiefly taken up by a summary of *Steno's* discoveries as regards the anatomy and physiology of the glands. The greater part of it has consequently been mentioned before, in various places of the previous *Treatises*. In the notes to the following reference is made to the earlier *Treatises*, but only as far as the more important passages are concerned.

P. 183. l. 6 from top.

mundas reddiderunt] *Th. Bartholin* published his discovery of the lymphatic vessels in his book *Vasa Lymphatica, Nuper Hafniæ in Animantibus inventa, Et Hepatis exsequiæ.* Hafniae 1653. See, moreover, note to vol. 1 p. 6. l. 16 from bottom. Chap. VI p. 39 *Bartholin* writes: *Sunt aquæ in Oceano*

falsæ, sunt & in fluvijs fontibusq; puræ & saporis expertes odorisq; splendiores vitro, quibus Najades & Ephydrides, Nymphæ purissimæ præsidebant. Nolumus has extra nos sollicitare. Nymphas corporibus nostris claudimus, & Najades in venis lymphaticis, si superstitionis esse liceret, veneremur. — As regards the conglobate and conglomerate glands, see note to vol. I p. 20. l. 17—18 from bottom.

P. 183. l. 7 from top.

Wirtzungio debent conglomeratae] *Wirtzung* was the first to find the pancreatic duct in the human body (1642), *Maur. Hoffman* having discovered it the year before in a turkey. Shortly after his discovery *Wirtzung* was killed by another physician.

P. 183. l. 9—10 from top.

Whartoni...Deusingius] *Wharton* published his discovery of the duct of the submaxillary gland in his *Adenographia... Londini 1656*. The editor of the present Edition has not been able to find anything about *Deusing's* relation to *Wharton* in those of *Deusing's* writings, which he has seen.

P. 183. l. 11 from top.

Blaſius] Concerning *Steno's* discovery of the parotid gland and *Blaes'* attempt to appropriate the honour of this discovery, see the Introduction and the previous Treatises *passim*, especially XIII.

P. 183. l. 14 from top.

in Observationibus] *Nicolai Stenonis Observationes Anatomicæ... Lugd. Batav. 1662*. It comprises II, IV, V and VI in the present Edition.

P. 183. l. 14—15 from top.

reliqua... exponam] *Steno* never published any extensive work on the glands; but he returned to these organs in his descriptions of the dissections of some rays and sharks. See the Treatises XVI vol. I p. 193, XXIII vol. II p. 113 and XXIV vol. II p. 147. See, also, the Appendix, vol. II p. 308.

P. 183. l. 19 from bottom.

Salivare exterius] See especially the Treatises I and II.

P. 183. l. 12 from bottom.

Epicuri intermundia] *Epicurus* maintained that there was an infinite number of worlds, between which were large and empty spaces, and that the atoms, flying through these spaces, united and thus made one world upon the other.

P. 183. l. 10—11 from bottom.

Apologiæ Prodromus] XIII vol. I p. 143 in the present Edition.

P. 183. l. 8 from bottom.

de testimoniis ejus] See the introduction to the notes to XIII, vol. I p. 252.

P. 184. l. 3—4 from top.

Anagrammaticam Hobokianum] See note to XIII vol. I p. 146. l. 3—4 from top.

P. 184. l. 9 from top.

non erubuit] Concerning *Steno's* controversy with *Deusing* see especially the Introduction and Treatise IV in the present Edition.

P. 184. l. 14 from top.

Buccarum vascula] See II vol. I p. 26.

P. 184. l. 12—13 from bottom.
[*sublingualia dicta*] See II vol. I
p. 27.

P. 184. l. 5 from bottom.
ad alia non attendi] Cf. XI vol. I
p. 135.

P. 185. l. 6 from top.
[*recipit vasa*] See II vol. I p. 27.

P. 185. l. 16 from top.
[*descendens meatus*] See VI vol. I
p. 96 and the note to p. 96. l. 18—19
from bottom.

P. 185. l. 14—15 from bottom.
in . . . œsophago . . . vasa] See XI
vol. I p. 135.

P. 185. l. 7 from bottom.
[*Quæ narium tunicam irrigant
vascula*] See VI vol. I p. 95.

P. 185. l. 2—3 from bottom.
in ovibus . . . notatum] See VI vol.
I p. 95.

P. 186. l. 2 from top.
in narium cava derivantes] See
III vol. I p. 56 ff. and V p. 83 ff.

P. 186. l. 13. from top.
[*Vasa palpebrarum*] See V vol. I
p. 81 ff.

P. 186. l. 17 from bottom.
in raja mihi confecta] See XVI
vol. I p. 196 ff.

P. 186. l. 10—11 from bottom.
De Usu Partium l. 2.] Galeni De
Usu Partium Corporis Humani Libri
XVII. lib II c. 3.

P. 187. l. 7 from top.
quibus sola evehencia contigere]
Steno here, as always, describes the con-
glomerate glands as belonging to the
lymphatic system and looks upon the
excretory ducts of these glands as lym-
phatic vessels.

P. 187. l. 11 from bottom.
ad absurdas . . . opiniones] See
notes to vol. I p. 32. l. 8 from top and
p. 68. l. 6 from bottom.

P. 187. l. 8—9 from bottom.
insertionis varietas . . . patebit]
See XII vol. I p. 139 ff. and note.

P. 187. l. 2—3 from bottom.
quod . . . recipit] Ed. Hafniæ 1664
has *qua* instead of *quod*.

P. 188. l. 2—3 from top.
per unicum . . . oftium] See note
to vol. I p. 187. l. 11 from bottom.

P. 188. l. 17 from top.
ductui bilario . . . gemino] See IX
vol. I p. 117.

P. 188. l. 8—9 from bottom.
a . . . Highmore . . . descriptam
video] See *Corporis Humani Disquisitio
Anatomica*; In *Qua Sangvinis Circula-
tionem in quavis Corporis particula plu-
rimis typis novis, ac Ænygmatum Me-
dicorum succinctis dilucidatione ornatam
prosequutus est Nathanael Highmorus*
... Hagæ-Comitis 1651. c. VIII p. 42
and plate IV p. 44.

P. 188. l. 3—4 from bottom.
[Whartoni fidens observationi]
See *Adenographia* . . . Authore Thomâ

Whartono. Londini 1656. c. XXI pp. 130-131. See, also, II vol. I p. 41.

P. 189. l. 3-4 from bottom.

[substantiam glandulosam] See VII vol. I pp. 101-102, XVI vol. I p. 196 and XXIII vol. II p. 116 ff.

P. 190. l. 5-6 from top.

[In ventriculis cerebri] See XXVIII vol. II p. 234 ff.

P. 190. l. 9 from top.

Humoris, unde & fit . . . foetus] See XXIV vol. II p. 153. Steno looked upon villi as being of glandular nature.

P. 191. l. 5 from top.

mentis imperio subjecta] As regards Steno's earlier view, which differs somewhat from the one expressed in this place, see the latter part of Treatise II in the present Edition, vol. I from § 30. p. 34, especially § 39. p. 38.

P. 191. l. 8 from bottom.

Antonius Everhardi] See *Novus Et Genuinus Hominis Brutique Animalis Exercitus. Authore Anthonio Everardi. Medioburgi* 1661. p. 280 ff.

P. 191. l. 1 from bottom.

nullum videre potui transitum] See XI vol. I, especially p. 134 and note to p. 134. l. 15 from top.

P. 192. l. 9-10 from top.

nulla glandularum facta mentione] See note to vol. I p. 28. l. 4 from top.

P. 192. l. 11 from top.

glandularum uti operculo] This possibly refers to a remark of Schneider's. See *Conradi Victoris Schneideri*

Liber Quintus Et Ultimus De Catarrhorum Diata. Wittebergæ 1662. c. I pp. 84-85.

XVI

DE ANATOME RAJÆ EPISTOLA.

The dissections of the two rays, on which this Treatise is based, must have taken place in Copenhagen shortly after Steno's return, in the spring of 1664. The Treatise is dated April 24 (old style) 1664, and was published the same year, the second of three Treatises in *Nicolai Stenonis De Musculis & Glandulis observationum Specimen Cum Epistolis duabus Anatomicis. Hafniæ* 1664. It is dedicated to *Willem Piso* (see note to vol. I p. 118. l. 17 from top).

P. 195. l. 12-13 from top.

primus viam monstrares] See IX vol. I p. 118.

P. 195. l. 14 from top.

corvi aquatici sectio] See IX vol. I p. 117 and note to p. 117. l. 7-8 from top.

P. 196. l. 1 from top.

oblatam] All editions have *ablatam*.

P. 196. l. 10 from top.

Binæ nobis erant rajæ] Probably *Raja batis*. See C. C. A. Gosch, *Udsigt over Danmarks zoologiske Literatur*. vol. II l. Kjøbenhavn 1872. p. 190.

P. 196. l. 1 from bottom.

non tincta punctula] Steno's discovery of the mucous canals, and his other observations on the rays were carried on by his pupil Lorenzini in *Osservazioni Intorno Alle Torpedini Fatte Da Stefano Lorenzini . . . In Firenze* 1678.

P. 197. l. 5—6 from top.

id vidiffem fæpius] See VI vol. I p. 96.

P. 197. l. 15 from bottom.

defectum fupplentes] See XIV vol. I p. 155, XV vol. I p. 172 ff., and especially XXII vol. II p. 67.

P. 198. l. 14 from bottom.

fuerint contextæ] See XV vol. I p. 174.

P. 198. l. 9 from bottom.

pafferem marinum præter] As to what, at the time of Steno, was meant by *asellus minor*, solea and passer marinus, see *Historiæ Naturalis De Piscibus Et Cetis Libri V. Cum æneis figuris Iohannes Ionstonvs . . . concinnavit*. Francofurti Ad Moenum [1649]. pp. 7—8 plate I 2, pp. 87—90 plate XX and p. 99.

P. 199. l. 12 from top.

xyftico] Ed. Hafniæ 1664 has *I ystico*.

P. 199. l. 16 from bottom.

nervea] See note to vol. I p. 95. l. 11—12 from top.

P. 199. l. 3—5 from bottom.

Simon Paulli . . . inferuit] See *Simonis Paulli . . . Quadripartitum Botanicum De Simplicivm Medicamentorum Facultatibus* . . . Argentorati 1667. p. 84. In the first edition, Rostock 1639, this is not mentioned.

P. 200. l. 2 from top.

eleganter] All editions have *elegant*.

P. 200. l. 13 from top.

ipfe pronuntiat] *Exercitationes De*

Generatione Animalium . . . Autore Gvlielmo Harveo . . . Londini 1651. Exercit. 4. p. 11: *Infunt omnibus avibus, ferpentibus, quadrupedibus oviparis, atque etiam pifcibus (ut facile in Cypcino videre eft) renes, & ureteres, per quos urina profluat: quod Aristotelem, alijsqve hætenus Philofophos latuit.* — See also *Aristoteles, De Animalibus Historia* (*As nspi rà Zḗta 'Ioropíou*) lib. II c. 16.

P. 200. l. 12—13 from bottom.

repletam] All editions have *repletum*.

P. 201. l. 9 from bottom.

quod . . . Simon Paulli contigit] Simon Paulli may have communicated this to Steno by word of mouth; at any rate it is not mentioned in Paulli's writings.

P. 202. l. 2 from top.

Rondeletium] See *Gvlielmi Rondeletii . . . Libri de Pifcibus Marinis, in quibus veræ Pifcium effigies expreffæ funt* . . . Lvgdvni 1554. lib. XII c. 4. pp. 342—344. In this place we find the picture of a ray's egg, which is described simply as an egg, not as the uterus of the fish. Reference to *Aristoteles, De Animalibus Historia* (*As nspi rà Zḗta 'Ioropíou*) lib. I c. 5, lib. II c. 13 and especially lib. VI c. 10.

P. 202. l. 2 from top.

Gefnerum] See *Conradi Gesneri . . . Historiæ Animalium Liber IIII, qui eft de Pifcium & Aquatiliū animantium natura* . . . Tigvri 1558. p. 930, where *Rondelet's* description is reprinted verbatim together with the picture of the egg.

P. 202. l. 2 from top.

Jonftonum] L c. p. 34 and plate XII

fig. 4, facing p. 37. — See note to vol. 1 p. 198. l. 9 from bottom.

P. 202. l. 12 from top.

uterum expositum] See Harvey, *Exercit. De Generat. Animal.* Exercit. 22. p. 70: *Est Ovum (ut diximus) quasi uterus expositus, et locus in quo foetus formatur: matricis enim munus obit...*

P. 202. l. 12 from bottom.

Harvæus Exerc. 68] *Ibid.* pp. 234–235.

P. 202. l. 3 from bottom.

expectant ovipara] As mentioned in the Introduction, Steno later on arrived at a far more correct view of this question, being the first to state that the testes of the females of the viviparous animals were the same organs as those called the ovaria in oviparous animals, and that also their function was exactly the same. See XXIV vol. II pp. 152–153.

P. 203. l. 5 from bottom.

pictura Authorum] This refers to the figure mentioned in the notes to vol. 1 p. 202. l. 2 from top.

P. 203. l. 3 from bottom.

extracta] All editions have *extractæ*.

P. 203. l. 1 from bottom.

propriæ] This word is not found in the Edd. Amstel. 1664 and Lugd. Batav. 1683.

P. 204. l. 5 from bottom.

asperæ arteriæ] *Arteria aspera* is the trachea.

P. 205. l. 9 from top.

res ... nulli controversiæ ob-

noxia est] Cf. *Antiperipatias. Hoc Est Adversus Aristoteleos De Respiratione Piscium Diatriba* ... Marci Avrelli Severini ... Neapoli 1659. p. 1, and *Nova Experimenta Pneumatica Respirationem Spectantia. Authore Roberto Boyle.* Genevæ 1686. V. p. 12: *Quæritur etiam, Quousque mereatur à nobis considerari, Numme in Aqua communi tantum Aeris lateat, qui usui frigidorum ejusmodi Animalium, ut sunt Pisces, sufficiat; atque num separabilis ille sit ab aqua, quæ per branchias ipsorum percolatur?*

P. 205. l. 17–18 from top.

non omnem ... transmitti sanguinem] The foramen ovale in the auricular septum of the fetus as a rule is being completely obliterated at birth; but occasionally a small oblique passage is left between the two auricles.

P. 205. l. 8–9 from bottom.

ut in ranis] See Malpighius' *De Pulmonibus Epistolæ II ad Borellium.* Bononiæ 1661. — Malpighius was the first to discover, by means of the microscope, that the ramifications of the trachea terminate in small vesiculæ (*alveoli*) surrounded by a fine network of arteries and veins. But it was not until he had begun to investigate lower animals, like frogs, that he succeeded in proving the anastomosis of the arteries with the veins through the capillaries. As to Steno's earlier view of this discovery see XI p. 131. l. 9 from top and note.

P. 206. l. 3 from top.

Apelles] See note to vol. 1 p. 14. l. 19 from top.

P. 206. l. 8–9 from bottom.

ex ... tuis de itinere Brasiliensi

[sermonibus] The work *Historia Naturalis Brasiliæ* ... Lygdvn. Batavorvm et Amstelodami 1648 contains *Guilielmi Pisonis* ... *De Medicina Brasiliensi Libri Quatuor* and *Georgi Margravi* ... *Historiæ Rerum Naturalium Brasiliæ, Libri Octo*. — See note to vol. I p. 118. l. 17 from top.

P. 207. l. 9 from top.

[Bartholinus] Th. Bartholin while a professor at the University of Copenhagen often left town for long periods at a time and went to live at his estate Hagestedgaard.

XVII

DE VITELLI IN INTESTINA PULLI TRANSITU EPISTOLA.

The observation, on which this Treatise is based, must have been made after Steno's return to Copenhagen in the spring of 1664, and before the 12th of June (old style), the date of the Treatise. It was published together with the two previous Treatises (XV and XVI) in *Nicolai Stenonis De Musculis & Glandulis observationum specimen* ... Hafniz 1664. It is dedicated to *Paulus Barbette*, a celebrated Amsterdam surgeon and author of medical books. See *Biogr. Woordenboek der Nederlanden*. vol. II l. p. 107.

In this Treatise Steno mentions his discovery of the vitelline duct in the newly hatched chicken. Observe, however, that this formation in the fetus of the hen was known and described as early as by *Aristotle*¹⁾, who also knew that the function of the vitelline duct was that of conducting the yolk into

the intestines of the fetus, with the view of nourishing the latter. But *Aristotle* entirely misunderstood the manner in which the vitelline duct originates; he thought that it was a transformation of one of the two πόροι πλεβικοί that proceed from the heart at an early stage of the fetal life. The knowledge of the vitelline duct was preserved throughout the antiquity, until as late as the 16th century, its formation and function being very clearly described in 1573 by *Volcherus Coiterus*²⁾. But after that, strange to say, the knowledge of the vitelline duct was lost, and though of course prominent investigators like *Fabricius ab Aquapendente*,³⁾ *Spigelius*⁴⁾ and *Harvey*⁵⁾ thoroughly knew the works of their predecessors, from *Aristotle* to *Coiter*, they did not understand that *Aristotle* and all his successors described a passage from the yolk-sac to the intestines, through which passage the yolk was conducted to the intestines with the view of nourishing the fetus. In their own investigations they never themselves came across the vitelline duct, and according to *Harvey* the nourishment of the fetus took place in a twofold manner, partly by the fetus swallowing the amniotic fluid, partly by its receiving the purior et sincerior pars of the latter direct into the vascular system through the umbilical veins.

¹⁾ *Externarum Et Internarum Principalium Humanæ Corporis Partium Tabulæ* ... Autore Volchero Coiter ... Noribergæ 1573. pp. 35—36.

²⁾ *Hieronymi Fabricii Ab Aquapendente De Formato Foetu*. Venetiis 1600.

Hieronymi Fabricii Ab Aquapendente ... De Formatione Ovi, Et Pulli Tractatus Accuratis-simus ... Patavii 1621.

³⁾ *Adriani Spigelii ... De Formato Foetu Liber Singularis* ... Patavii 1626.

⁴⁾ *Exercitationes De Generatione Animalium* ... Autore Guiljelmo Harveo. Londini 1651.

¹⁾ *De Animalibus Historia*. VI 3.
De Generatione Animalium. III 2.

Thus, when Steno found the vitelline duct and correctly described its function, it was to him and his contemporaries a new and highly important discovery, though it may seem strange that this discovery had to be made afresh. In a letter to Thévenot, written after 1665 and printed two years later as part of *Elementorum Myologiae Specimen*, Florentiae 1667, p. 49 (XXII vol. II pp. 95-96 in the present Edition), Steno tells that it had been brought against him as a charge that the same discovery had been made at an earlier period by Coiter, Huibertus and Meibomius. As is mentioned above, it is quite true that Coiter had described the vitelline duct, but Steno was right in maintaining that when Harvey, who had spent several years of his life in studying these matters, did not understand Coiter's description, it was perfectly pardonable that he himself, who had never until then had anything to do with this subject, did not understand it either, while on the other hand he cannot be said to be right, when he maintains that Coiter expressed himself indistinctly.

As regards Huibertus the editor of the present Edition can give no information, not even as to his identity, and as to Meibomius' connection with this discovery of Steno's he has likewise been unable to find anything.

However Steno was not the first to find the vitelline duct, after the knowledge of it had been lost. Three years after the appearance of his above-mentioned book Needham relates that he had found the vitelline duct as early

as 1654, however without having published his discovery.¹⁾

As to the demonstration of the vitelline duct in placental animals see the introduction to the notes to Treatise XXVI vol. II p. 167. See, moreover, Vilhelm Maar, *Om Opdagelsen af ductus vitello-intestinalis*. Det Kgl. Danske Videnskabernes Selskabs Forhandling. 1908. V p. 233 ff.

The figure belonging to this Treatise is to be found on p. 163 of this volume (right corner at the bottom).

P. 212. l. 19 from bottom.

vacabit] Ed. Hafniae 1664 has vocabit.

P. 213. l. 18-19 from bottom.

juxta observationes Harvæi] See *Exercit. De Generat. Animal.* Exercit. 52 p. 164: Aristoteles quidem decimo post nativitatem die, aliquid vitelli superesse reperit: nos autem, etiam post sex septimanas, nonnihil ejus, in ventre pulli, intestino affixum vidimus.

P. 215. l. 17 from bottom.

authoritas Aristotelis Harvæique] See Aristoteles, *De Animalibus Historia* (Ἀπὸ τῶν ζῴων ἱστορίαι) lib. VI c. 3 and *Exercit. De Generat. Animal.* Exercit. 52 p. 164: quæ [sc. venæ] omnes in unum truncum collectæ, in venam Portæ perforantur; pleniorisque in jecore coctionis gratiâ, partem vitelli, quam absorbent, eò deferunt.

¹⁾ *Disquisitio Anatomica De Formato Foetu.* Authore Gualtero Needham. M. D. Londini 1667. c. IV p. 97 ff.



